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Revised Chemical Ranking Methodology Testing Results

by

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for

**U.S. Environmental Protection Agency
Office of Solid Waste
Washington, DC 20460**

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Note to the Reader

This analysis was conducted using data available in July of 1998. Since that time, several chemicals were added to the Candidate Chemical List, and changes to the data underlying the scoring and ranking of chemicals have occurred. These changes include changes in the WMPT scores, changes to the ATSDR HazDat data and Fish Advisory data used for the environmental presence criterion scoring, and corrections to the TRI quantities and generator counts used for several metals. These changes, while significant, resulted in only 6 additional chemicals scoring 50 points or above (61, compared with 55 previously). The general affects of scoring method changes and their magnitude described in this report and the conclusions drawn are expected to still hold, although the specific chemical counts and rank changes would be altered.

1.0 Purpose

As directed by EPA in Technical Directive #4 and Quick Response Task #6, RTI conducted an analysis of the chemical ranking method developed in Task 3. The goal of this testing was to determine the importance of various ranking factors. This involved an examination of the following:

Importance of each primary criterion. The affect of dropping each primary criterion one at a time was examined.

Importance of RCRA Relevance and Environmental Presence. There had been some discussion that the ranking method could be based solely on PBT considerations and chemical quantity/prevalence. To explore this, we looked at the affect of dropping both the RCRA Relevance and Environmental Presence criteria from the method.

Sensitivity to Fenceline Selection. For the draft Ranking Methodology fenceline values for assigning subcriteria scores for the Quantity/Prevalence criterion were generally made based on judgement. To examine the affect of this, we applied an alternative approach to fenceline determination.

2.0 Method

To conduct this analysis, the approach we took was to re-rank the chemicals based on a revised methodology derived to examine the factor of interest. The primary indicator we considered was the change in a chemical's rank between the original Ranking Methodology and the revised version. This was considered more important than the change in the chemical's score since the chemical's absolute score is not generally as meaningful as its score relative to other chemicals in the list.

In looking at the differences between the original Methodology and each revision, we

1. Determined each chemical's score and rank change
2. Plotted a histogram of the rank change for all chemicals and for the top 50 ranked chemicals in the revised list
3. Examined how many chemicals changed by more than 10 ranks
4. Determined how many chemicals moved into and out of the top 50.

The combination of these factors provides a sense of the degree to which the change has affected the ranking of the chemicals, and particularly the affect on the highest ranking chemicals.

We focused on the highest ranking chemicals because the goal of the ranking effort is to identify highly ranked chemicals to be on a final waste minimization measurement list. In this context, if the top 30 chemicals are selected, a chemical that moves positions from a rank of 20 to a rank of 5 would not be as important in the final list selection as a chemical that moves from a rank of 40 to a rank of 25. Further, a chemical that moves from a rank of 140 to a rank of 80 would be changing 60 ranks, but would still not make the final list.

Each one of the criterion changes was considered independently rather than in combination with other changes.

3.0 Results

Results for each factor change are discussed below. In general, each set of results includes a table of all the chemicals with the revised final score, the original final score, the score change, the revised final rank, the original final rank, and the rank change. If the score in the revised method is higher than in the original, this is indicated by a “+” value, while a decline in score is indicated by a “-” value. For example, if the original score was 50 and the revised score was 60, the change would be indicated by +10. For the rank, a “+” value indicates a rise to a higher rank rather than an increase in the rank number. For example, if a chemical goes from a rank of 10 in the original method to a rank of 5 in the revised method, this is indicated by a +5 change in rank. Highlighted chemicals in the tables indicate chemicals in the top 50 in the revised rank that were not in the top 50 in the original rank, and chemicals that were in the top 50 in the original rank but have moved below the top 50 in the revised rank.

Each set of results also includes 2 histograms. The first histogram shows the rank change distribution for all the chemicals, while the second shows only the rank changes for those chemicals in the top 50 in the revised ranking. Note that in several cases there were several chemicals of equal rank, so that the “top 50” chemicals list contains more than 50 chemicals. In the histograms, the values under each bar indicate a bin of values less than or equal to the value shown and greater than the value to the immediate left. For example, for bins 8, 10, and 12, the bar above the “10” bin includes the chemicals that changed either 9 or 10 ranks and the “12” bin includes the chemicals that changed 11 or 12 ranks.

3.1 Importance of Each Primary Criterion

To explore the importance of each primary criterion, we examined the affect on the ranking of eliminating each primary criterion (i.e. giving the criterion a weight of 0). Weighting factors for each of the other criteria were adjusted so that chemicals were still scored on a range of 0 to 100.

3.11 PBT Criterion

The results of eliminating the PBT criterion are shown in Table 1 and Figures 1 and 2. Eliminating the PBT subscore resulted in changes of greater than 10 ranks for about 29% of the entire chemical list and about 32% of the “top 50” chemicals. However, more than 24% of all chemicals moved more than 20 ranks, and 9 chemicals moved at least 30 ranks. The histogram for all chemicals shows both the main portion of rank changes centered around 0 to 10 ranks as well as two peaks at either end of the scale, indicating the large number of chemicals changing more than 20 ranks. 14 chemicals moved between the top 50 group and the remainder of the chemical list - 6 chemicals moved into the top 50 and 8 dropped out. None of the chemicals in

Table 1: Ranking without Waste Minimization Tool PBT Data Criterion

CAS No.	Chemical Name	Score without PBT	Score with all Criteria	Score Change	Rank without PBT	Rank with all Criteria	Rank Change
7440473	Chromium	92.6	77.8	+14.8	1	7	+6
7439921	Lead	92.6	94.4	-1.9	1	1	+0
N590	Polycyclic aromatic compounds	88.9	91.7	-2.8	3	2	-1
7440382	Arsenic	87.0	73.6	+13.4	4	10	+6
7440439	Cadmium	87.0	90.3	-3.2	4	3	-1
91203	Naphthalene	86.1	72.9	+13.2	6	11	+5
1336363	Polychlorinated biphenyls	86.1	89.6	-3.5	7	4	-3
7439976	Mercury	84.3	88.2	-3.9	8	5	-3
117817	Bis(2-ethylhexyl)phthalate	79.6	76.4	+3.2	9	8	-1
71556	1,1,1-Trichloroethane	78.7	67.4	+11.3	10	17	+7
127184	Tetrachloroethylene	78.7	59.0	+19.7	10	32	+22
79016	Trichloroethylene	78.7	59.0	+19.7	10	32	+22
7440020	Nickel	77.8	66.7	+11.1	13	20	+7
7440360	Antimony	75.9	65.3	+10.6	14	22	+8
75092	Methylene chloride	75.0	56.3	+18.8	15	41	+26
108952	Phenol	75.0	64.6	+10.4	15	23	+8
7440666	Zinc	73.1	63.2	+10.0	17	26	+9
107062	1,2-Dichloroethane	72.2	62.5	+9.7	18	27	+9
86737	Fluorene	71.3	78.5	-7.2	19	6	-13
129000	Pyrene	71.3	70.1	+1.2	19	13	-6
79345	1,1,2,2-Tetrachloroethane	69.4	52.1	+17.4	21	47	+26
7440224	Silver	69.4	69.4	+0.0	21	15	-6
95501	1,2-Dichlorobenzene	68.5	59.7	+8.8	23	31	+8
206440	Fluoranthene	68.5	76.4	-7.9	23	8	-15
83329	Acenaphthene	67.6	59.0	+8.6	25	36	+11
120127	Anthracene	67.6	67.4	+0.2	25	17	-8
7440417	Beryllium	66.7	58.3	+8.3	27	37	+10
84742	Dibutyl phthalate	66.7	66.7	+0.0	27	20	-7
7782492	Selenium	65.7	57.6	+8.1	29	39	+10
7440508	Copper	64.8	56.9	+7.9	30	40	+10
106467	1,4-Dichlorobenzene	63.9	56.3	+7.6	31	41	+10
120821	1,2,4-Trichlorobenzene	63.0	63.9	-0.9	32	25	-7
87683	Hexachlorobutadiene	61.1	70.8	-9.7	33	12	-21
87865	Pentachlorophenol	61.1	62.5	-1.4	33	27	-6
75343	1,1-Dichloroethane	60.2	53.5	+6.7	35	44	+9
117840	Di-n-octyl phthalate	60.2	70.1	-10.0	35	13	-22
91576	2-Methylnaphthalene	59.3	52.8	+6.5	37	45	+8
57125	Cyanide	59.3	52.8	+6.5	38	45	+7

(continued)

CAS No.	Chemical Name	Score without PBT	Score with all Criteria	Score Change	Rank without PBT	Rank with all Criteria	Rank Change
98953	Nitrobenzene	58.3	52.1	+6.3	39	47	+8
541731	1,3-Dichlorobenzene	57.4	51.4	+6.0	40	50	+10
85018	Phenanthrene	57.4	68.1	-10.6	40	16	-24
630206	1,1,1,2-Tetrachloroethane	56.5	42.4	+14.1	42	68	+26
85687	Butyl benzyl phthalate	56.5	50.7	+5.8	42	53	+11
118741	Hexachlorobenzene	56.5	67.4	-10.9	42	17	-25
106934	Ethylene dibromide (EDB)	53.7	40.3	+13.4	45	74	+29
58899	gamma-hexachlorocyclohexane	52.8	64.6	-11.8	46	23	-23
76448	Heptachlor	52.8	47.9	+4.9	46	57	+11
67721	Hexachloroethane	50.9	46.5	+4.4	48	58	+10
319846	Hexachlorocyclohexane, alpha-	50.0	54.2	-4.2	49	43	-6
319857	Hexachlorocyclohexane, beta-	50.0	45.8	+4.2	49	59	+10
608935	Pentachlorobenzene	49.1	61.8	-12.7	51	29	-22
1024573	Heptachlor epoxide	49.1	61.8	-12.7	51	30	-21
74839	Bromomethane	48.1	44.4	+3.7	53	60	+7
7439965	Manganese	48.1	48.1	+0.0	53	56	+3
56382	Parathion	48.1	44.4	+3.7	53	60	+7
77474	Hexachlorocyclopentadiene	47.2	43.8	+3.5	58	62	+4
74884	Iodomethane	47.2	43.8	+3.5	58	62	+4
599644	Phenol, 4-(1-methyl-1-phenylethyl)-	47.2	43.8	+3.5	56	62	+6
90437	Phenylphenol, o-	47.2	43.8	+3.5	56	62	+6
319868	Hexachlorocyclohexane, delta-	46.3	43.1	+3.2	60	67	+7
191242	Benzo(g,h,i)perylene	45.4	59.0	-13.7	61	34	-27
72435	Methoxychlor	45.4	59.0	-13.7	61	34	-27
298022	Phorate	45.4	42.4	+3.0	61	68	+7
95943	1,2,4,5-Tetrachlorobenzene	44.4	58.3	-13.9	64	37	-27
7005723	4-Chlorophenyl phenyl ether	44.4	33.3	+11.1	64	89	+25
122394	Diphenylamine	44.4	41.7	+2.8	64	71	+7
74908	Hydrocyanic acid	44.4	41.7	+2.8	64	71	+7
75445	Phosgene	44.4	41.7	+2.8	64	71	+7
95954	2,4,5-Trichlorophenol	41.7	39.6	+2.1	69	76	+7
79061	Acrylamide	41.7	31.3	+10.4	69	97	+28
7440484	Cobalt	41.7	41.7	+0.0	69	70	+1
75218	Ethylene oxide	41.7	31.3	+10.4	69	97	+28
96764	Phenol, 2,2-bis(1,1-dimethylethyl)-	41.7	39.6	+2.1	69	76	+7
7429905	Aluminum	40.7	38.9	+1.9	74	78	+4
99650	1,3-Dinitrobenzene	36.1	35.4	+0.7	75	80	+5
119471	2,2'-Methylenebis(4-methyl-6-tert-butylphenol)	36.1	35.4	+0.7	75	80	+5
101144	4,4'-Methylenebis(2-chloroaniline)	36.1	35.4	+0.7	75	80	+5
106489	4-Chlorophenol	36.1	35.4	+0.7	75	80	+5

(continued)

CAS No.	Chemical Name	Score without PBT	Score with all Criteria	Score Change	Rank without PBT	Rank with all Criteria	Rank Change
107028	Acrolein	36.1	27.1	+9.0	75	107	+32
17804352	Benomyl	36.1	35.4	+0.7	75	80	+5
1563662	Carbofuran	36.1	35.4	+0.7	75	80	+5
132649	Dibenzofuran	36.1	43.8	-7.6	75	62	-13
1675543	Diglycidal ether of Bisphenol A	36.1	35.4	+0.7	75	80	+5
732263	Phenol, 2,4,6-tris(1,1-dimethylethyl)-	36.1	52.1	-16.0	75	47	-28
25154523	Phenol, nonyl-	36.1	35.4	+0.7	75	80	+5
959988	Endosulfan, alpha-	35.2	51.4	-16.2	86	50	-36
33213659	Endosulfan, beta-	35.2	51.4	-16.2	86	50	-36
101553	4-Bromophenyl phenyl ether	34.3	50.7	-16.4	88	53	-35
298000	Methyl parathion	34.3	34.0	+0.2	88	88	+0
82688	Pentachloronitrobenzene	33.3	50.0	-16.7	90	55	-35
298044	Disulfoton	31.5	31.9	-0.5	91	95	+4
1031078	Endosulfan sulfate	31.5	31.9	-0.5	91	95	+4
7440622	Vanadium	30.6	30.6	+0.0	93	101	+8
100254	1,4-Dinitrobenzene	30.6	31.3	-0.7	96	97	+1
75070	Acetaldehyde	30.6	22.9	+7.6	93	117	+24
107186	Allyl alcohol	30.6	31.3	-0.7	93	97	+4
1163195	Decabromodiphenyl oxide	27.8	29.2	-1.4	99	103	+4
333415	Diazinon	27.8	29.2	-1.4	97	103	+6
2303175	Triallate	27.8	37.5	-9.7	97	79	-18
115297	Endosulfan	26.9	28.5	-1.6	100	105	+5
1912249	Atrazine	25.9	27.8	-1.9	101	106	+5
54115	Nicotinea	25.0	27.1	-2.1	102	107	+5
128370	2,6-Di-tert-butyl-p-cresol	22.2	25.0	-2.8	103	109	+6
79118	Chloroacetic acid	22.2	25.0	-2.8	103	109	+6
137268	Thiram	22.2	25.0	-2.8	105	109	+4
1582098	Trifluralin	20.4	40.3	-19.9	106	74	-32
91941	3,3'-Dichlorobenzidine	19.4	14.6	+4.9	107	144	+37
116063	Aldicarb	19.4	22.9	-3.5	107	117	+10
60515	Dimethoate	19.4	22.9	-3.5	107	117	+10
1861321	Dacthal	18.5	30.6	-12.0	110	102	-8
119904	3,3'-Dimethoxybenzidine	16.7	20.8	-4.2	111	120	+9
101779	4,4'-Methylenebisbenzenamine	16.7	20.8	-4.2	111	120	+9
1897456	Chlorthalonil	16.7	20.8	-4.2	111	120	+9
88891	Picric acid	16.7	20.8	-4.2	111	120	+9
13071799	Terbufos	16.7	20.8	-4.2	111	120	+9
528290	1,2-Dinitrobenzene	11.1	16.7	-5.6	116	125	+9
25973551	2-(2'-Hydroxy-3',5'-(di-t-amyl)phenyl)benzotriazole	11.1	33.3	-22.2	116	89	-27
79743	2,5-Di-(1,1-dimethylpropyl)hydroquinone	11.1	33.3	-22.2	116	89	-27
99309	2,6-Dichloro-4-nitroaniline	11.1	16.7	-5.6	116	125	+9

(continued)

CAS No.	Chemical Name	Score without PBT	Score with all Criteria	Score Change	Rank without PBT	Rank with all Criteria	Rank Change
20325400	3,3'-Dimethyloxybenzidine dihydrochloride	11.1	16.7	-5.6	116	125	+9
60093	4-(Phenylazo)benzenamine	11.1	16.7	-5.6	116	125	+9
101688	4,4'-Methylenediphenyl isocyanate	11.1	16.7	-5.6	116	125	+9
101804	4,4'-Oxybisbenzenamine	11.1	16.7	-5.6	116	125	+9
96695	4,4'-Thiobis(6-tert-butyl-m-cresol)	11.1	16.7	-5.6	116	125	+9
834128	Ametryn	11.1	16.7	-5.6	116	125	+9
1861401	Benefin	11.1	33.3	-22.2	116	89	-27
56038892	Benzenamine, N-(1-ethylpropyl)-3,4-dimethyl-	11.1	25.0	-13.9	116	109	-7
90948	Bis(4-(dimethylamino)phenyl)methanone	11.1	16.7	-5.6	116	125	+9
314409	Bromoacil	11.1	11.1	+0.0	116	146	+30
1689992	Bromoxynil octanoate	11.1	25.0	-13.9	116	109	-7
2832408	C.I. Disperse yellow 3	11.1	16.7	-5.6	116	125	+9
5598130	Chlorpyrifos methyl	11.1	25.0	-13.9	116	109	-7
78488	DEF	11.1	25.0	-13.9	116	109	-7
115322	Dicofol	11.1	33.3	-22.2	116	89	-27
330552	Linuron	11.1	16.7	-5.6	116	125	+9
111659	Octane	11.1	16.7	-5.6	116	125	+9
42874033	Oxyfluorfen	11.1	11.1	+0.0	116	146	+30
40487421	Pendimethalin	11.1	33.3	-22.2	116	89	-27
92842	Phenothiazine	11.1	16.7	-5.6	116	125	+9
5468757	Pigment yellow 14	11.1	16.7	-5.6	116	125	+9
9003536	Polystyrene	11.1	25.0	-13.9	116	109	-7
1929824	Pyridine, 2-chloro-6-(trichloromethyl)-	11.1	16.7	-5.6	116	125	+9
122349	Simazine	11.1	16.7	-5.6	116	125	+9
961115	Tetrachlorvinphos	11.1	16.7	-5.6	116	125	+9
56359	Tributyltin oxide	11.1	11.1	+0.0	116	146	+30
639587	Triphenyltin chloride	11.1	16.7	-5.6	116	125	+9
1120214	Undecane	11.1	16.7	-5.6	116	125	+9
97563	2-Methyl-4-((2-methylphenyl)azo)benzenamine	5.6	12.5	-6.9	148	145	-3
99592	2-Methoxy-5-nitrobenzenamine	0.0	8.3	-8.3	149	149	+0
569642	Basic green 4	0.0	8.3	-8.3	149	149	+0

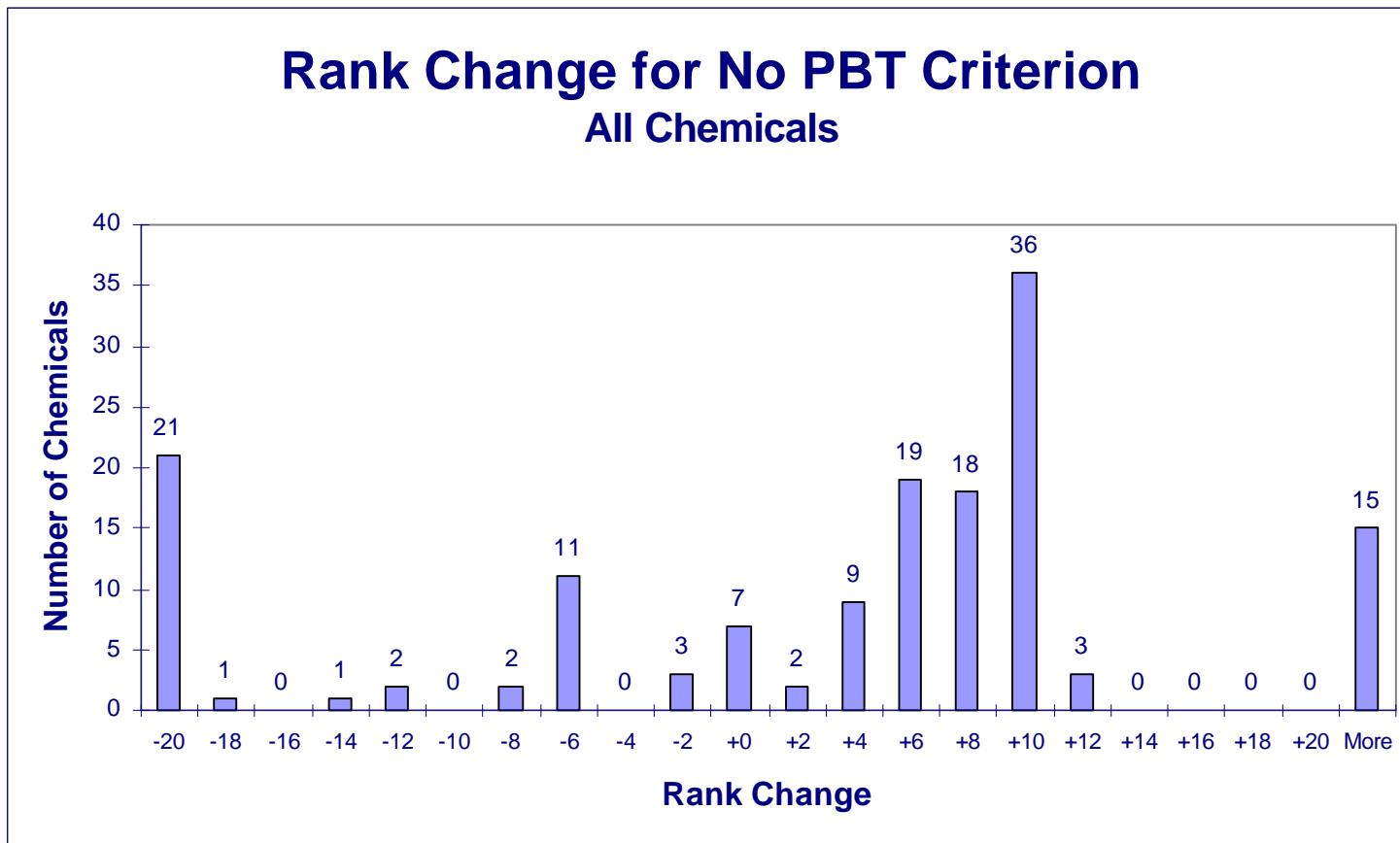


Figure 1

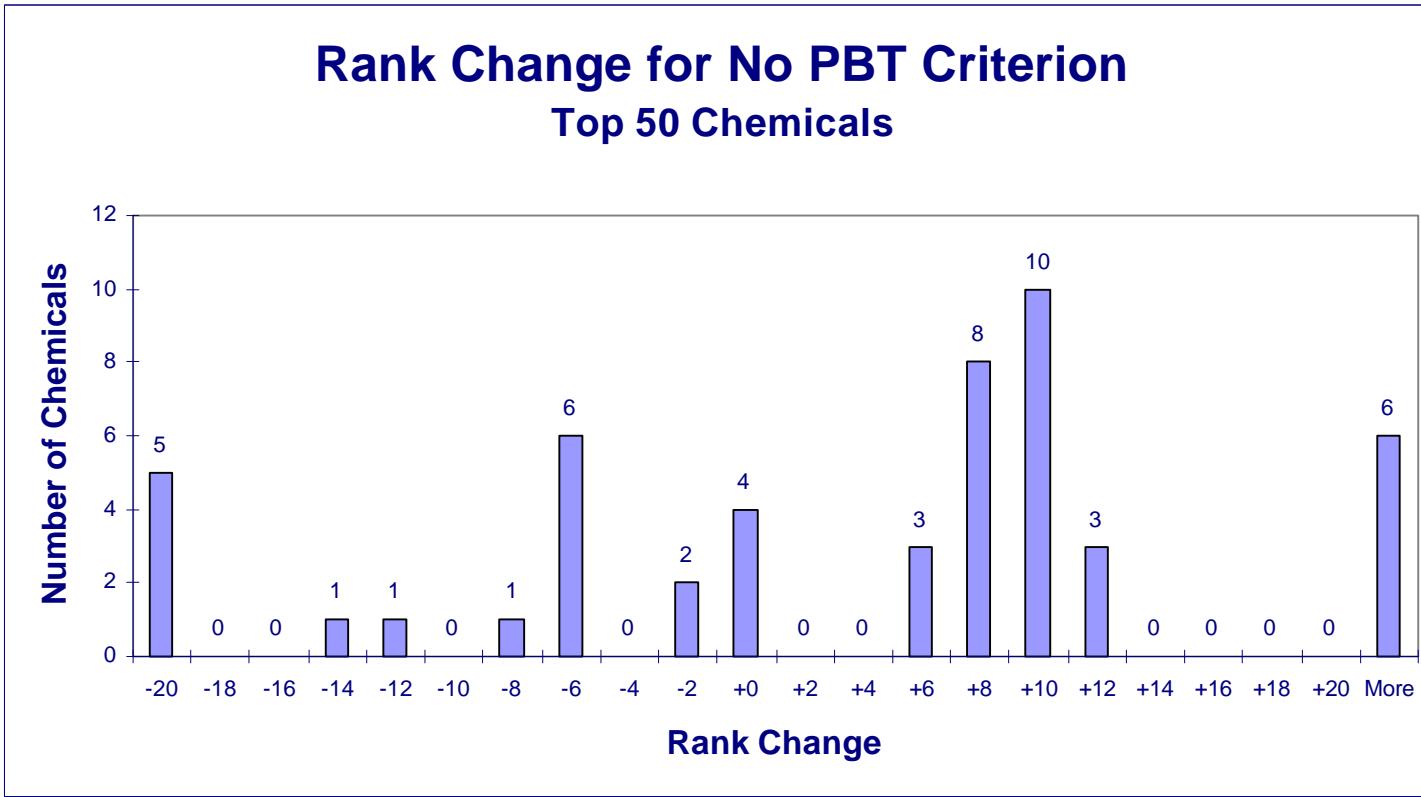


Figure 2

the revised top 40 chemicals were ranked any lower than 50 in the original ranking. Some significant rank increases occurred for tetrachloroethylene, trichloroethylene, methylene chloride, and 1,1,2,2 trichloroethane. These were all chemicals that had low PBT scores but were added to the Candidate Chemical List based on their presence on the draft Office of International Activities list.

3.1.2 RCRA Relevance Criterion

The results of eliminating the RCRA Relevance criterion are shown in Table 2 and Figures 3 and 4. More than 60% of chemicals changed by more than 10 ranks, while 30% of the top 50 chemicals changed more than 10 ranks. Nearly 33% of all chemicals moved more than 20 ranks, which is reflected by the large peaks at either end of the histogram. 12% of the chemicals in the new “top 50” moved up more than 20 ranks, with manganese moving up 49 ranks to 7th. The top 5 chemicals were unchanged. Sixteen chemicals moved between the top 50 group and the remainder of the chemical list - 7 chemicals moved into the top 50 and 9 dropped out. Three chemicals (manganese, aluminum, and trifluralin) moved more than 40 ranks and into the top 50.

3.1.3 Environmental Presence Criterion

The results of eliminating the Environmental Presence criterion are shown in Table 3 and Figures 5 and 6. About 13% of chemicals changed by more than 10 ranks, while about 26% of the top 50 chemicals changed more than 10 ranks. However, only 4 chemicals moved more than 20 ranks. The histogram for the rank changes for all chemicals shows most chemicals changed fewer than 6 ranks, although the spread is somewhat wider for the top 50 chemicals. Ten chemicals moved between the top 54 group and the remainder of the chemical list - 4 chemicals moved into the top 50 and 6 dropped out. In general, this criterion appeared to have somewhat less affect than the other criteria.

3.1.4 Quantity/Persistence Criterion

The results of eliminating the Quantity/Persistence criterion are shown in Table 4 and Figures 7 and 8. About 26% of chemicals changed by more than 10 ranks, while about 32% of the top 50 chemicals changed more than 10 ranks. Only about 5% of all chemicals changed more than 20 ranks, however. None of the top 40 chemicals was ranked lower than 50 in the original score. Nine chemicals moved between the top 50 group and the remainder of the chemical list - 4 chemicals moved into the top 50 and 5 dropped out.

3.2 Importance of RCRA Relevance and Environmental Presence

A comparison of ranks was conducted with both the RCRA relevance and Environmental Persistence criteria removed (i.e. scoring based on PBT and Quantity/Prevalence only). The results are shown in Table 5 and Figures 9 and 10. Again, weighting factors were adjusted to keep all scores on a 0-100 point scale. Nearly 75% of the chemicals changed at least 10 ranks, and more than 60% changed more than 20 ranks. More than 13% of all chemicals changed as many as 50 ranks or more. The histogram shows that rank changes are distributed mostly at the scale extremes, indicating a major change to the rankings caused by dropping both of these criteria. More than 50% of the top 50 chemicals changed by more than 20 ranks, and both

Table 2: Ranking without RCRA Relevance Criterion

CAS No.	Chemical Name	Score without RCRA	Score with all Criteria	Score Change	Rank without RCRA	Rank with all Criteria	Rank Change
7439921	Lead	92.6	94.4	-1.9	1	1	+0
N590	Polycyclic aromatic compounds	88.9	91.7	-2.8	2	2	+0
7440439	Cadmium	87.0	90.3	-3.2	3	3	+0
1336363	Polychlorinated biphenyls	86.1	89.6	-3.5	4	4	+0
7439976	Mercury	84.3	88.2	-3.9	5	5	+0
85018	Phenanthrene	74.1	68.1	+6.0	6	16	+10
7439965	Manganese	72.2	48.1	+24.1	7	56	+49
86737	Fluorene	71.3	78.5	-7.2	8	6	-2
7440473	Chromium	70.4	77.8	-7.4	9	7	-2
117817	Bis(2-ethylhexyl)phthalate	68.5	76.4	-7.9	10	8	-2
206440	Fluoranthene	68.5	76.4	-7.9	10	8	-2
7440508	Copper	67.6	56.9	+10.6	12	40	+28
7440666	Zinc	67.6	63.2	+4.4	12	26	+14
1024573	Heptachlor epoxide	65.7	61.8	+3.9	14	30	+16
7440382	Arsenic	64.8	73.6	-8.8	15	10	-5
118741	Hexachlorobenzene	64.8	67.4	-2.5	15	17	+2
91203	Naphthalene	63.9	72.9	-9.0	17	11	-6
7440020	Nickel	63.9	66.7	-2.8	17	20	+3
191242	Benzo(g,h,i)perylene	62.0	59.0	+3.0	19	34	+15
58899	gamma-hexachlorocyclohexane	61.1	64.6	-3.5	20	23	+3
87683	Hexachlorobutadiene	61.1	70.8	-9.7	20	12	-8
117840	Di-n-octyl phthalate	60.2	70.1	-10.0	22	13	-9
129000	Pyrene	60.2	70.1	-10.0	22	13	-9
608935	Pentachlorobenzene	57.4	61.8	-4.4	24	29	+5
71556	1,1,1-Trichloroethane	56.5	67.4	-10.9	25	17	-8
120127	Anthracene	56.5	67.4	-10.9	25	17	-8
84742	Dibutyl phthalate	55.6	66.7	-11.1	27	20	-7
7440224	Silver	54.2	69.4	-15.3	28	15	-13
7440360	Antimony	53.7	65.3	-11.6	29	22	-7
72435	Methoxychlor	53.7	59.0	-5.3	29	34	+5
1582098	Trifluralin	53.7	40.3	+13.4	29	74	+45
95943	1,2,4,5-Tetrachlorobenzene	52.8	58.3	-5.6	32	37	+5
108952	Phenol	52.8	64.6	-11.8	32	23	-9
7429905	Aluminum	51.9	38.9	+13.0	34	78	+44
7782492	Selenium	51.9	57.6	-5.8	34	39	+5
120821	1,2,4-Trichlorobenzene	51.9	63.9	-12.0	36	25	-11
959988	Endosulfan, alpha-	51.9	51.4	+0.5	36	50	+14
33213659	Endosulfan, beta-	51.9	51.4	+0.5	36	50	+14
101553	4-Bromophenyl phenyl ether	50.9	50.7	+0.2	39	53	+14

(continued)

CAS No.	Chemical Name	Score without RCRA	Score with all Criteria	Score Change	Rank without RCRA	Rank with all Criteria	Rank Change
107062	1,2-Dichloroethane	50.0	62.5	-12.5	40	27	-13
7440484	Cobalt	50.0	41.7	+8.3	40	70	+30
132649	Dibenzofuran	50.0	43.8	+6.3	40	62	+22
82688	Pentachloronitrobenzene	50.0	50.0	+0.0	40	55	+15
87865	Pentachlorophenol	50.0	62.5	-12.5	40	27	-13
319846	Hexachlorocyclohexane, alpha-	47.2	54.2	-6.9	45	43	-2
95501	1,2-Dichlorobenzene	46.3	59.7	-13.4	46	31	-15
83329	Acenaphthene	45.4	59.0	-13.7	47	36	-11
57125	Cyanide	45.4	52.8	-7.4	47	45	-2
127184	Tetrachloroethylene	45.4	59.0	-13.7	47	32	-15
79016	Trichloroethylene	45.4	59.0	-13.7	47	32	-15
25973551	2-(2'-Hydroxy-3',5'-(di-t-amyl)phenyl)benzotriazole	44.4	33.3	+11.1	51	89	+38
79743	2,5-Di-(1,1-dimethylpropyl)hydroquinone	44.4	33.3	+11.1	51	89	+38
1861401	Benefin	44.4	33.3	+11.1	51	89	+38
7440417	Beryllium	44.4	58.3	-13.9	51	37	-14
115322	Dicofol	44.4	33.3	+11.1	51	89	+38
40487421	Pendimethalin	44.4	33.3	+11.1	51	89	+38
732263	Phenol, 2,4,6-tris(1,1-dimethylethyl)-	44.4	52.1	-7.6	51	47	-4
106467	1,4-Dichlorobenzene	41.7	56.3	-14.6	58	41	-17
75092	Methylene chloride	41.7	56.3	-14.6	58	41	-17
1861321	Dacthal	40.7	30.6	+10.2	60	102	+42
333415	Diazinon	38.9	29.2	+9.7	61	103	+42
76448	Heptachlor	38.9	47.9	-9.0	61	57	-4
1163195	Decabromodiphenyl oxide	38.9	29.2	+9.7	63	103	+40
75343	1,1-Dichloroethane	38.0	53.5	-15.5	64	44	-20
91576	2-Methylnaphthalene	37.0	52.8	-15.7	65	45	-20
1912249	Atrazine	37.0	27.8	+9.3	65	106	+41
67721	Hexachloroethane	37.0	46.5	-9.5	65	58	-7
79345	1,1,2,2-Tetrachloroethane	36.1	52.1	-16.0	68	47	-21
319857	Hexachlorocyclohexane, beta-	36.1	45.8	-9.7	68	59	-9
98953	Nitrobenzene	36.1	52.1	-16.0	68	47	-21
541731	1,3-Dichlorobenzene	35.2	51.4	-16.2	71	50	-21
74839	Bromomethane	34.3	44.4	-10.2	72	60	-12
85687	Butyl benzyl phthalate	34.3	50.7	-16.4	72	53	-19
7440622	Vanadium	33.3	30.6	+2.8	74	101	+27
128370	2,6-Di-tert-butyl-p-cresol	33.3	25.0	+8.3	75	109	+34
107186	Allyl alcohol	33.3	31.3	+2.1	75	97	+22
56038892	Benzenamine, N-(1-ethylpropyl)-3,4-dimethyl-	33.3	25.0	+8.3	75	109	+34
1689992	Bromoxynil octanoate	33.3	25.0	+8.3	75	109	+34
79118	Chloroacetic acid	33.3	25.0	+8.3	75	109	+34

(continued)

CAS No.	Chemical Name	Score without RCRA	Score with all Criteria	Score Change	Rank without RCRA	Rank with all Criteria	Rank Change
5598130	Chlorpyrifos methyl	33.3	25.0	+8.3	75	109	+34
78488	DEF	33.3	25.0	+8.3	75	109	+34
599644	Phenol, 4-(1-methyl-1-phenylethyl)-	33.3	43.8	-10.4	75	62	-13
90437	Phenylphenol, o-	33.3	43.8	-10.4	75	62	-13
9003536	Polystyrene	33.3	25.0	+8.3	75	109	+34
2303175	Triallate	33.3	37.5	-4.2	75	79	+4
319868	Hexachlorocyclohexane, delta-	32.4	43.1	-10.6	86	67	-19
298022	Phorate	31.5	42.4	-10.9	87	68	-19
101144	4,4'-Methylenebis(2-chloroaniline)	30.6	35.4	-4.9	88	80	-8
122394	Diphenylamine	30.6	41.7	-11.1	88	71	-17
74908	Hydrocyanic acid	30.6	41.7	-11.1	88	71	-17
75445	Phosgene	30.6	41.7	-11.1	88	71	-17
115297	Endosulfan	29.6	28.5	+1.2	92	105	+13
298000	Methyl parathion	28.7	34.0	-5.3	93	88	-5
95954	2,4,5-Trichlorophenol	27.8	39.6	-11.8	94	76	-18
101779	4,4'-Methylenebisbenzenamine	27.8	20.8	+6.9	94	120	+26
1897456	Chlorthalonil	27.8	20.8	+6.9	94	120	+26
54115	Nicotinea	27.8	27.1	+0.7	94	107	+13
96764	Phenol, 2,2-bis(1,1-dimethylethyl)-	27.8	39.6	-11.8	94	76	-18
88891	Picric acid	27.8	20.8	+6.9	94	120	+26
13071799	Terbufos	27.8	20.8	+6.9	94	120	+26
298044	Disulfoton	25.9	31.9	-6.0	101	95	-6
1031078	Endosulfan sulfate	25.9	31.9	-6.0	101	95	-6
56382	Parathion	25.9	44.4	-18.5	101	60	-41
100254	1,4-Dinitrobenzene	25.0	31.3	-6.3	104	97	-7
75218	Ethylene oxide	25.0	31.3	-6.3	104	97	-7
77474	Hexachlorocyclopentadiene	25.0	43.8	-18.8	104	62	-42
74884	Iodomethane	25.0	43.8	-18.8	104	62	-42
137268	Thiram	25.0	25.0	+0.0	104	109	+5
630206	1,1,1,2-Tetrachloroethane	23.1	42.4	-19.2	109	68	-41
528290	1,2-Dinitrobenzene	22.2	16.7	+5.6	110	125	+15
99650	1,3-Dinitrobenzene	22.2	35.4	-13.2	110	80	-30
119471	2,2'-Methylenebis(4-methyl-6-tert-butylphenol)	22.2	35.4	-13.2	110	80	-30
99309	2,6-Dichloro-4-nitroaniline	22.2	16.7	+5.6	110	125	+15
20325400	3,3'-Dimethoxybenzidine dihydrochloride	22.2	16.7	+5.6	110	125	+15
60093	4-(Phenylazo)benzenamine	22.2	16.7	+5.6	110	125	+15
101688	4,4'-Methylenediphenyl isocyanate	22.2	16.7	+5.6	110	125	+15
101804	4,4'-Oxybisbenzenamine	22.2	16.7	+5.6	110	125	+15
96695	4,4'-Thiobis(6-tert-butyl-m-cresol)	22.2	16.7	+5.6	110	125	+15
106489	4-Chlorophenol	22.2	35.4	-13.2	110	80	-30

(continued)

CAS No.	Chemical Name	Score without RCRA	Score with all Criteria	Score Change	Rank without RCRA	Rank with all Criteria	Rank Change
75070	Acetaldehyde	22.2	22.9	-0.7	110	117	+7
116063	Aldicarb	22.2	22.9	-0.7	110	117	+7
834128	Ametryn	22.2	16.7	+5.6	110	125	+15
17804352	Benomyl	22.2	35.4	-13.2	110	80	-30
90948	Bis(4-(dimethylamino)phenyl)methanone	22.2	16.7	+5.6	110	125	+15
2832408	C.I. Disperse yellow 3	22.2	16.7	+5.6	110	125	+15
1563662	Carbofuran	22.2	35.4	-13.2	110	80	-30
1675543	Diglycidal ether of Bisphenol A	22.2	35.4	-13.2	110	80	-30
60515	Dimethoate	22.2	22.9	-0.7	110	117	+7
330552	Linuron	22.2	16.7	+5.6	110	125	+15
111659	Octane	22.2	16.7	+5.6	110	125	+15
25154523	Phenol, nonyl-	22.2	35.4	-13.2	110	80	-30
92842	Phenothiazine	22.2	16.7	+5.6	110	125	+15
5468757	Pigment yellow 14	22.2	16.7	+5.6	110	125	+15
1929824	Pyridine, 2-chloro-6-(trichloromethyl)-	22.2	16.7	+5.6	110	125	+15
122349	Simazine	22.2	16.7	+5.6	110	125	+15
961115	Tetrachlorvinphos	22.2	16.7	+5.6	110	125	+15
639587	Triphenyltin chloride	22.2	16.7	+5.6	110	125	+15
1120214	Undecane	22.2	16.7	+5.6	110	125	+15
106934	Ethylene dibromide (EDB)	20.4	40.3	-19.9	139	74	-65
119904	3,3'-Dimethoxybenzidine	19.4	20.8	-1.4	140	120	-20
107028	Acrolein	19.4	27.1	-7.6	140	107	-33
314409	Bromoacil	16.7	11.1	+5.6	142	146	+4
42874033	Oxyfluorfen	16.7	11.1	+5.6	142	146	+4
56359	Tributyltin oxide	16.7	11.1	+5.6	142	146	+4
97563	2-Methyl-4-((2-methylphenyl)azo)benzenamine	16.7	12.5	+4.2	145	145	+0
79061	Acrylamide	16.7	31.3	-14.6	145	97	-48
99592	2-Methoxy-5-nitrobenzenamine	11.1	8.3	+2.8	147	149	+2
91941	3,3'-Dichlorobenzidine	11.1	14.6	-3.5	147	144	-3
7005723	4-Chlorophenyl phenyl ether	11.1	33.3	-22.2	147	89	-58
569642	Basic green 4	11.1	8.3	+2.8	147	149	+2

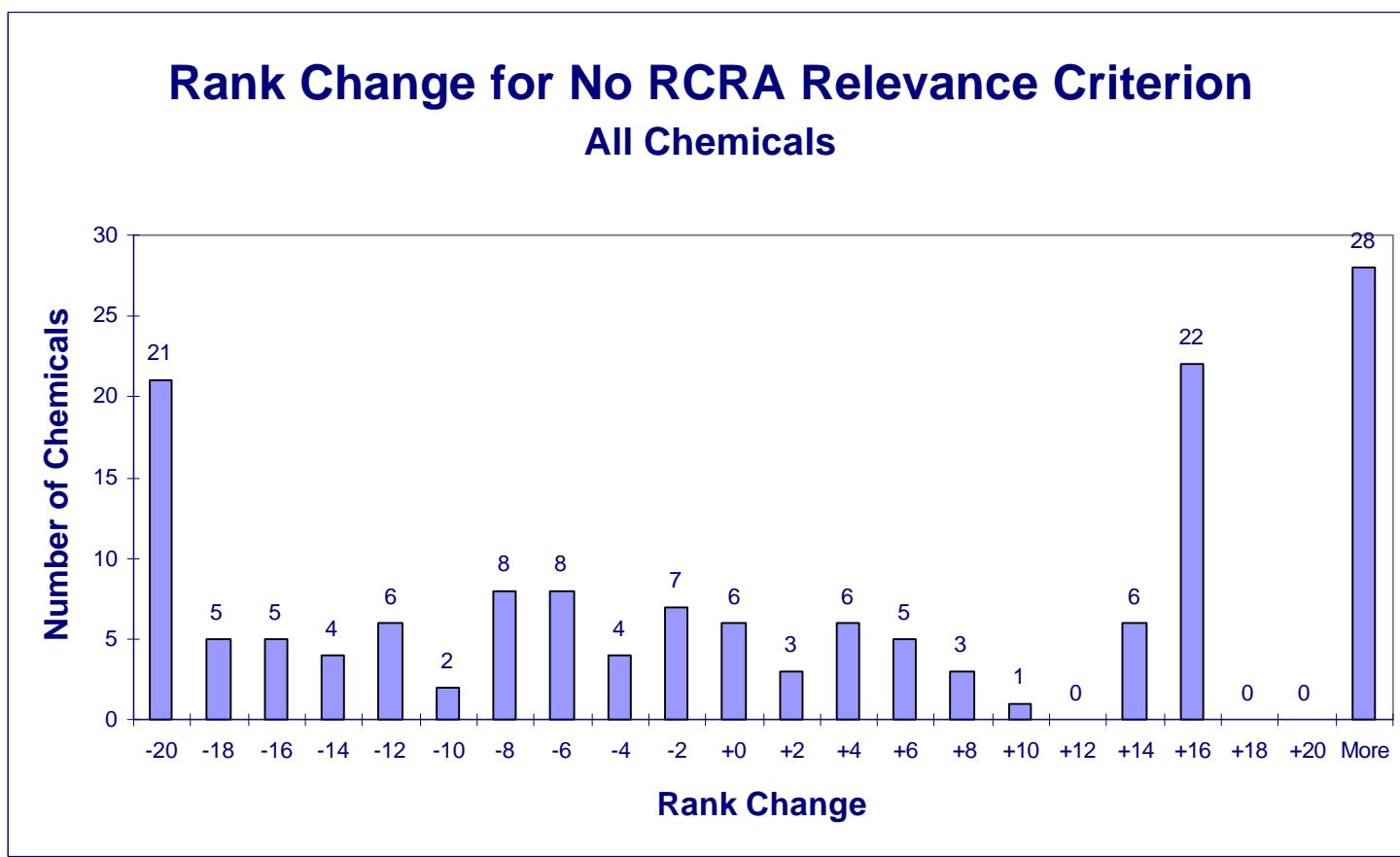


Figure 3

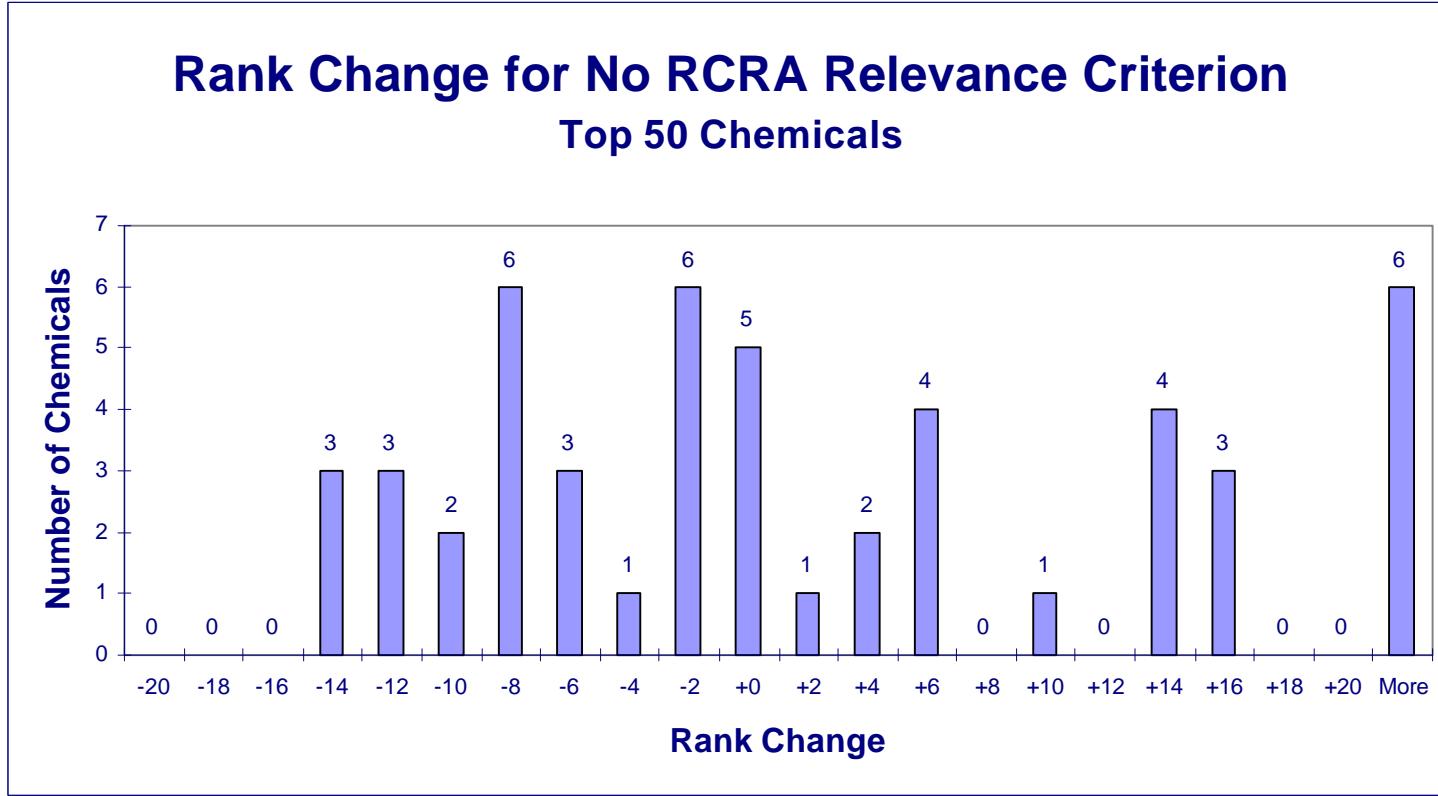


Figure 4

Table 3: Ranking Without Environmental Presence Criterion

CAS No.	Chemical Name	Score without Env. Pres.	Score with all Criteria	Score Change	Rank without Env. Pres.	Rank with all Criteria	Rank Change
7439921	Lead	100.0	94.4	+5.6	1	1	+0
N590	Polycyclic aromatic compounds	100.0	91.7	+8.3	1	2	+1
7440439	Cadmium	94.4	90.3	+4.2	3	3	+0
7439976	Mercury	91.7	88.2	+3.5	4	5	+1
7440224	Silver	87.5	69.4	+18.1	5	15	+10
117840	Di-n-octyl phthalate	86.1	70.1	+16.0	6	13	+7
86737	Fluorene	86.1	78.5	+7.6	6	6	+0
1336363	Polychlorinated biphenyls	86.1	89.6	-3.5	6	4	-2
117817	Bis(2-ethylhexyl)phthalate	83.3	76.4	+6.9	9	8	-1
206440	Fluoranthene	83.3	76.4	+6.9	9	8	-1
87683	Hexachlorobutadiene	83.3	70.8	+12.5	9	12	+3
95943	1,2,4,5-Tetrachlorobenzene	77.8	58.3	+19.4	12	37	+25
120821	1,2,4-Trichlorobenzene	77.8	63.9	+13.9	12	25	+13
7440473	Chromium	77.8	77.8	+0.0	12	7	-5
84742	Dibutyl phthalate	77.8	66.7	+11.1	12	20	+8
71556	1,1,1-Trichloroethane	75.0	67.4	+7.6	16	17	+1
91203	Naphthalene	75.0	72.9	+2.1	16	11	-5
108952	Phenol	75.0	64.6	+10.4	16	23	+7
120127	Anthracene	75.0	67.4	+7.6	19	17	-2
58899	gamma-hexachlorocyclohexane	75.0	64.6	+10.4	19	23	+4
118741	Hexachlorobenzene	75.0	67.4	+7.6	19	17	-2
72435	Methoxychlor	75.0	59.0	+16.0	19	34	+15
608935	Pentachlorobenzene	75.0	61.8	+13.2	19	29	+10
129000	Pyrene	75.0	70.1	+4.9	19	13	-6
87865	Pentachlorophenol	72.2	62.5	+9.7	25	27	+2
85018	Phenanthrene	72.2	68.1	+4.2	25	16	-9
95501	1,2-Dichlorobenzene	72.2	59.7	+12.5	27	31	+4
107062	1,2-Dichloroethane	72.2	62.5	+9.7	27	27	+0
7440360	Antimony	72.2	65.3	+6.9	27	22	-5
7440382	Arsenic	72.2	73.6	-1.4	27	10	-17
98953	Nitrobenzene	69.4	52.1	+17.4	31	47	+16
732263	Phenol, 2,4,6-tris(1,1-dimethylethyl)-	69.4	52.1	+17.4	31	47	+16
7440417	Beryllium	66.7	58.3	+8.3	33	37	+4
57125	Cyanide	66.7	52.8	+13.9	33	45	+12
7440020	Nickel	66.7	66.7	+0.0	33	20	-13
82688	Pentachloronitrobenzene	66.7	50.0	+16.7	36	55	+19
75343	1,1-Dichloroethane	63.9	53.5	+10.4	37	44	+7
106467	1,4-Dichlorobenzene	63.9	56.3	+7.6	37	41	+4
83329	Acenaphthene	63.9	59.0	+4.9	37	36	-1

(continued)

CAS No.	Chemical Name	Score without Env. Pres.	Score with all Criteria	Score Change	Rank without Env. Pres.	Rank with all Criteria	Rank Change
85687	Butyl benzyl phthalate	63.9	50.7	+13.2	37	53	+16
75092	Methylene chloride	63.9	56.3	+7.6	37	41	+4
127184	Tetrachloroethylene	63.9	59.0	+4.9	37	32	-5
79016	Trichloroethylene	63.9	59.0	+4.9	37	32	-5
101553	4-Bromophenyl phenyl ether	63.9	50.7	+13.2	44	53	+9
191242	Benzo(g,h,i)perylene	63.9	59.0	+4.9	44	34	-10
1024573	Heptachlor epoxide	63.9	61.8	+2.1	44	30	-14
7E+06	Cobalt	62.5	41.7	+20.8	47	70	+23
541731	1,3-Dichlorobenzene	61.1	51.4	+9.7	48	50	+2
959988	Endosulfan, alpha-	61.1	51.4	+9.7	48	50	+2
33213659	Endosulfan, beta-	61.1	51.4	+9.7	48	50	+2
319846	Hexachlorocyclohexane, alpha-	61.1	54.2	+6.9	51	43	-8
67721	Hexachloroethane	58.3	46.5	+11.8	52	58	+6
599644	Phenol, 4-(1-methyl-1-phenylethyl)-	58.3	43.8	+14.6	52	62	+10
90437	Phenylphenol, o-	58.3	43.8	+14.6	52	62	+10
8E+06	Selenium	58.3	57.6	+0.7	52	39	-13
7E+06	Zinc	58.3	63.2	-4.9	52	26	-26
79345	1,1,2,2-Tetrachloroethane	58.3	52.1	+6.3	57	47	-10
77474	Hexachlorocyclopentadiene	58.3	43.8	+14.6	57	62	+5
74884	Iodomethane	58.3	43.8	+14.6	57	62	+5
91576	2-Methylnaphthalene	55.6	52.8	+2.8	60	45	-15
74839	Bromomethane	55.6	44.4	+11.1	60	60	+0
122394	Diphenylamine	55.6	41.7	+13.9	60	71	+11
74908	Hydrocyanic acid	55.6	41.7	+13.9	60	71	+11
56382	Parathion	55.6	44.4	+11.1	60	60	+0
75445	Phosgene	55.6	41.7	+13.9	60	71	+11
630206	1,1,1,2-Tetrachloroethane	52.8	42.4	+10.4	66	68	+2
95954	2,4,5-Trichlorophenol	52.8	39.6	+13.2	66	76	+10
76448	Heptachlor	52.8	47.9	+4.9	66	57	-9
96764	Phenol, 2,2-bis(1,1-dimethylethyl)-	52.8	39.6	+13.2	66	76	+10
298022	Phorate	52.8	42.4	+10.4	66	68	+2
7E+06	Copper	50.0	56.9	-6.9	71	40	-31
106934	Ethylene dibromide (EDB)	50.0	40.3	+9.7	71	74	+3
319857	Hexachlorocyclohexane, beta-	50.0	45.8	+4.2	71	59	-12
319868	Hexachlorocyclohexane, delta-	50.0	43.1	+6.9	71	67	-4
7439965	Manganese	50.0	48.1	+1.9	71	56	-15
2303175	Triallate	50.0	37.5	+12.5	71	79	+8
1582098	Trifluralin	50.0	40.3	+9.7	71	74	+3
99650	1,3-Dinitrobenzene	47.2	35.4	+11.8	78	80	+2
119471	2,2'-Methylenebis(4-methyl-6-tert-butylphenol)	47.2	35.4	+11.8	78	80	+2

(continued)

CAS No.	Chemical Name	Score without Env. Pres.	Score with all Criteria	Score Change	Rank without Env. Pres.	Rank with all Criteria	Rank Change
101144	4,4'-Methylenebis(2-chloroaniline)	47.2	35.4	+11.8	78	80	+2
106489	4-Chlorophenol	47.2	35.4	+11.8	78	80	+2
17804352	Benomyl	47.2	35.4	+11.8	78	80	+2
1563662	Carbofuran	47.2	35.4	+11.8	78	80	+2
132649	Dibenzofuran	47.2	43.8	+3.5	78	62	-16
1675543	Diglycidal ether of Bisphenol A	47.2	35.4	+11.8	78	80	+2
25154523	Phenol, nonyl-	47.2	35.4	+11.8	78	80	+2
7440622	Vanadium	45.8	30.6	+15.3	87	101	+14
25973551	2-(2'-Hydroxy-3',5'-(di-t-amyl)phenyl)benzotriazole	44.4	33.3	+11.1	88	89	+1
79743	2,5-Di-(1,1-dimethylpropyl)hydroquinone	44.4	33.3	+11.1	88	89	+1
7005723	4-Chlorophenyl phenyl ether	44.4	33.3	+11.1	88	89	+1
7429905	Aluminum	44.4	38.9	+5.6	88	78	-10
1861401	Benefin	44.4	33.3	+11.1	88	89	+1
115322	Dicofol	44.4	33.3	+11.1	88	89	+1
40487421	Pendimethalin	44.4	33.3	+11.1	88	89	+1
100254	1,4-Dinitrobenzene	41.7	31.3	+10.4	95	97	+2
79061	Acrylamide	41.7	31.3	+10.4	95	97	+2
107186	Allyl alcohol	41.7	31.3	+10.4	95	97	+2
75218	Ethylene oxide	41.7	31.3	+10.4	95	97	+2
298000	Methyl parathion	41.7	34.0	+7.6	95	88	-7
298044	Disulfoton	38.9	31.9	+6.9	100	95	-5
1031078	Endosulfan sulfate	38.9	31.9	+6.9	100	95	-5
1163195	Decabromodiphenyl oxide	38.9	29.2	+9.7	102	103	+1
107028	Acrolein	36.1	27.1	+9.0	103	107	+4
54115	Nicotinea	36.1	27.1	+9.0	103	107	+4
128370	2,6-Di-tert-butyl-p-cresol	33.3	25.0	+8.3	105	109	+4
1912249	Atrazine	33.3	27.8	+5.6	105	106	+1
56038892	Benzenamine, N-(1-ethylpropyl)-3,4-dimethyl-	33.3	25.0	+8.3	105	109	+4
1689992	Bromoxynil octanoate	33.3	25.0	+8.3	105	109	+4
79118	Chloroacetic acid	33.3	25.0	+8.3	105	109	+4
5598130	Chlorpyrifos methyl	33.3	25.0	+8.3	105	109	+4
1861321	Dacthal	33.3	30.6	+2.8	105	102	-3
78488	DEF	33.3	25.0	+8.3	105	109	+4
9003536	Polystyrene	33.3	25.0	+8.3	105	109	+4
137268	Thiram	33.3	25.0	+8.3	105	109	+4
75070	Acetaldehyde	30.6	22.9	+7.6	115	117	+2
116063	Aldicarb	30.6	22.9	+7.6	115	117	+2
60515	Dimethoate	30.6	22.9	+7.6	115	117	+2
115297	Endosulfan	30.6	28.5	+2.1	115	105	-10
119904	3,3'-Dimethoxybenzidine	27.8	20.8	+6.9	119	120	+1

(continued)

CAS No.	Chemical Name	Score without Env. Pres.	Score with all Criteria	Score Change	Rank without Env. Pres.	Rank with all Criteria	Rank Change
101779	4,4'-Methylenebisbenzenamine	27.8	20.8	+6.9	119	120	+1
1897456	Chlorthalonil	27.8	20.8	+6.9	119	120	+1
333415	Diazinon	27.8	29.2	-1.4	119	103	-16
88891	Picric acid	27.8	20.8	+6.9	119	120	+1
13071799	Terbufos	27.8	20.8	+6.9	119	120	+1
528290	1,2-Dinitrobenzene	22.2	16.7	+5.6	125	125	+0
99309	2,6-Dichloro-4-nitroaniline	22.2	16.7	+5.6	125	125	+0
20325400	3,3'-Dimethoxybenzidine dihydrochloride	22.2	16.7	+5.6	125	125	+0
60093	4-(Phenylazo)benzenamine	22.2	16.7	+5.6	125	125	+0
101688	4,4'-Methylenediphenyl isocyanate	22.2	16.7	+5.6	125	125	+0
101804	4,4'-Oxybisbenzenamine	22.2	16.7	+5.6	125	125	+0
96695	4,4'-Thiobis(6-tert-butyl-m-cresol)	22.2	16.7	+5.6	125	125	+0
834128	Ametryn	22.2	16.7	+5.6	125	125	+0
90948	Bis(4-(dimethylamino)phenyl)methanone	22.2	16.7	+5.6	125	125	+0
2832408	C.I. Disperse yellow 3	22.2	16.7	+5.6	125	125	+0
330552	Linuron	22.2	16.7	+5.6	125	125	+0
111659	Octane	22.2	16.7	+5.6	125	125	+0
92842	Phenothiazine	22.2	16.7	+5.6	125	125	+0
5468757	Pigment yellow 14	22.2	16.7	+5.6	125	125	+0
1929824	Pyridine, 2-chloro-6-(trichloromethyl)-	22.2	16.7	+5.6	125	125	+0
122349	Simazine	22.2	16.7	+5.6	125	125	+0
961115	Tetrachlorvinphos	22.2	16.7	+5.6	125	125	+0
639587	Triphenyltin chloride	22.2	16.7	+5.6	125	125	+0
1120214	Undecane	22.2	16.7	+5.6	125	125	+0
91941	3,3'-Dichlorobenzidine	19.4	14.6	+4.9	144	144	+0
314409	Bromoacil	16.7	11.1	+5.6	145	146	+1
42874033	Oxyfluorfen	16.7	11.1	+5.6	145	146	+1
56359	Tributyltin oxide	16.7	11.1	+5.6	145	146	+1
97563	2-Methyl-4-((2-methylphenyl)azo)benzenamine	16.7	12.5	+4.2	148	145	-3
99592	2-Methoxy-5-nitrobenzenamine	11.1	8.3	+2.8	149	149	+0
569642	Basic green 4	11.1	8.3	+2.8	149	149	+0

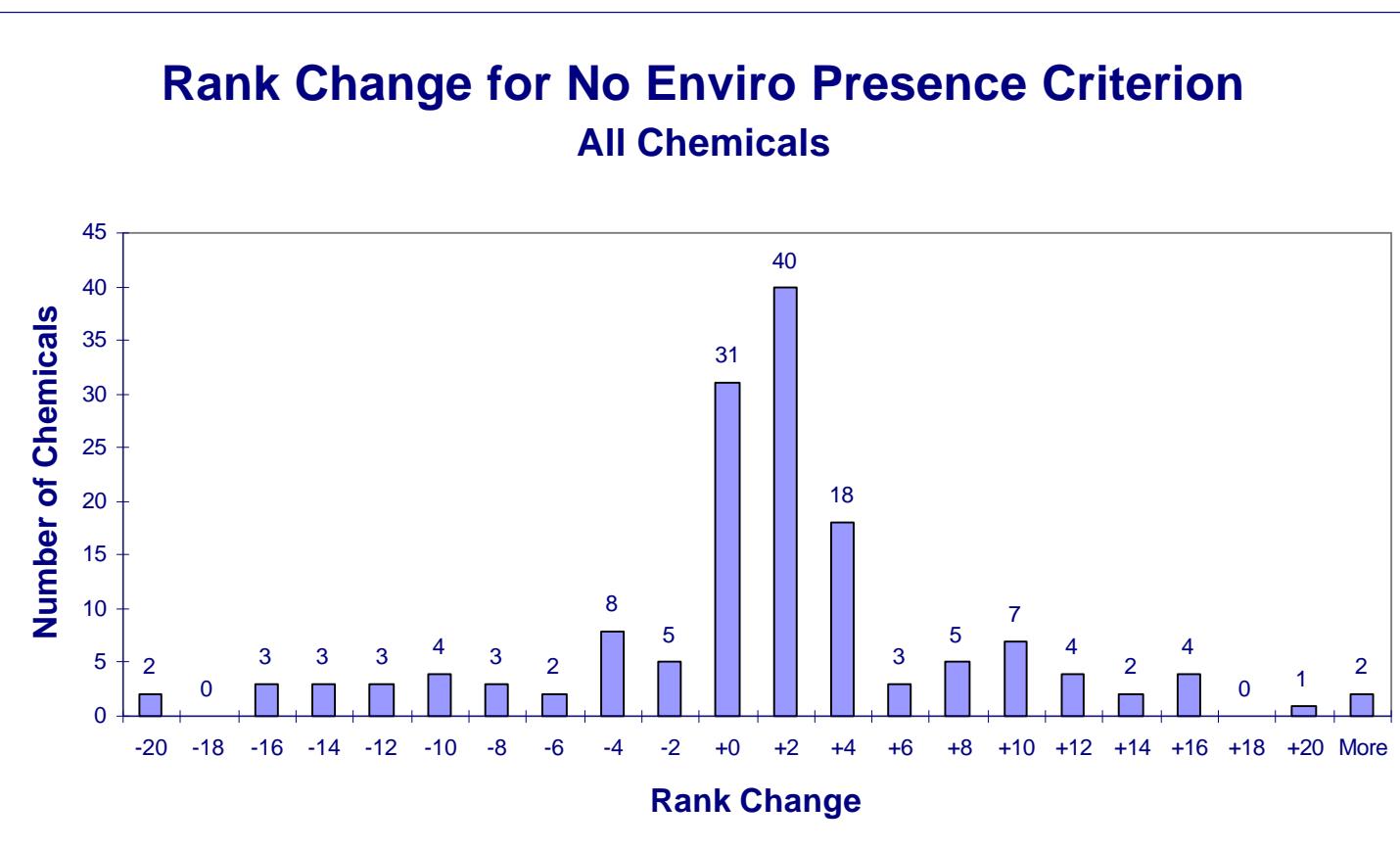


Figure 5

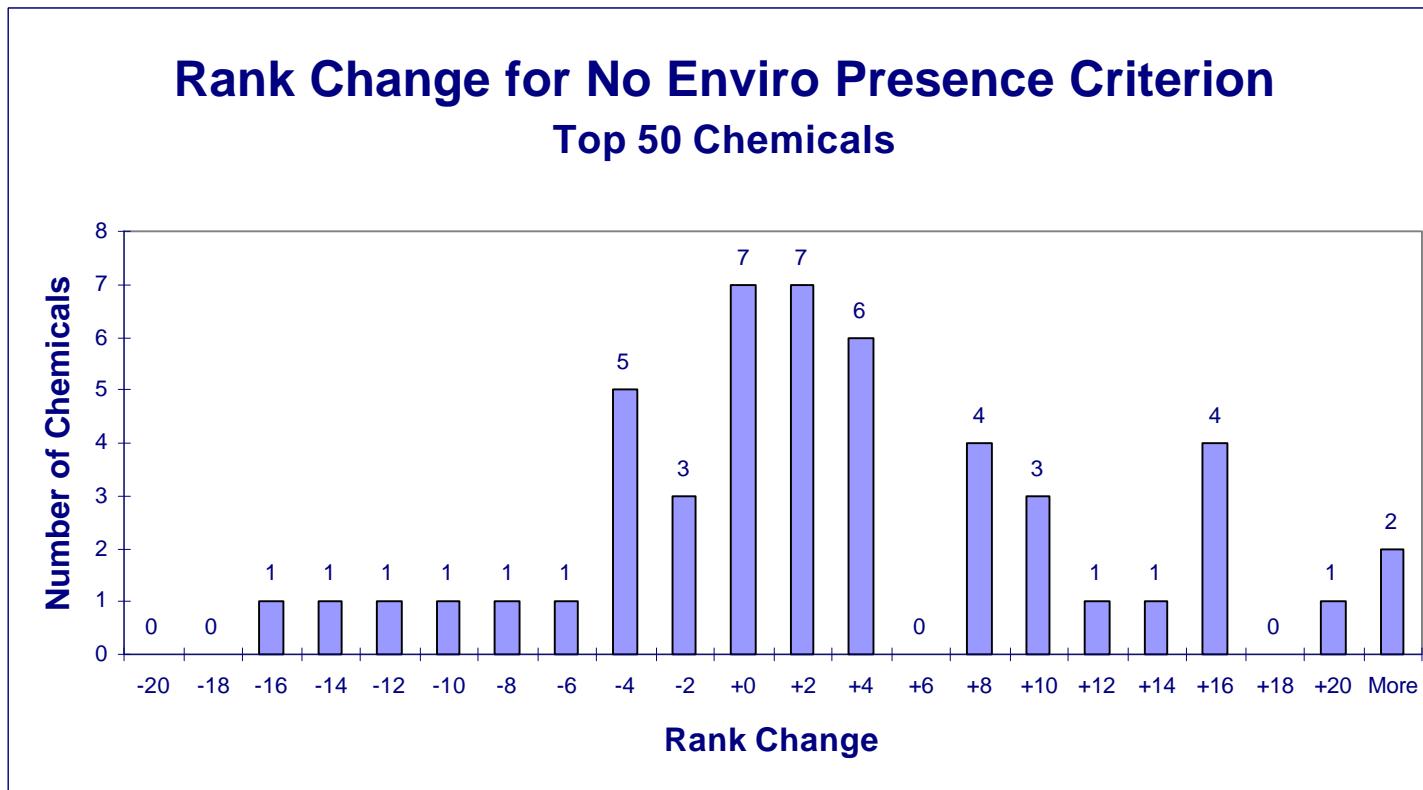


Figure 6

Table 4: Ranking Without Quantity/Prevalence Criterion

CAS No.	Chemical Name	Final Score	Score with all Criteria	Score Change	Rank	Rank with all Criteria	Rank Change
1336363	Polychlorinated biphenyls	100.0	89.6	+10.4	1	4	+3
7440439	Cadmium	92.6	90.3	+2.3	2	3	+1
7439921	Lead	92.6	94.4	-1.9	2	1	-1
7439976	Mercury	92.6	88.2	+4.4	2	5	+3
N590	Polycyclic aromatic compounds	88.9	91.7	-2.8	5	2	-3
206440	Fluoranthene	85.2	76.4	+8.8	6	8	+2
86737	Fluorene	85.2	78.5	+6.7	6	6	+0
87683	Hexachlorobutadiene	77.8	70.8	+6.9	8	12	+4
117817	Bis(2-ethylhexyl)phthalate	74.1	76.4	-2.3	9	8	-1
117840	Di-n-octyl phthalate	74.1	70.1	+3.9	9	13	+4
129000	Pyrene	74.1	70.1	+3.9	9	13	+4
118741	Hexachlorobenzene	73.1	67.4	+5.8	12	17	+5
120127	Anthracene	70.4	67.4	+3.0	13	17	+4
7440382	Arsenic	70.4	73.6	-3.2	14	10	-4
7440473	Chromium	70.4	77.8	-7.4	14	7	-7
58899	gamma-hexachlorocyclohexane	69.4	64.6	+4.9	16	23	+7
1024573	Heptachlor epoxide	68.5	61.8	+6.7	17	30	+13
85018	Phenanthrene	68.5	68.1	+0.5	17	16	-1
91203	Naphthalene	66.7	72.9	-6.2	19	11	-8
7440224	Silver	66.7	69.4	-2.8	19	15	-4
84742	Dibutyl phthalate	66.7	66.7	+0.0	21	20	-1
87865	Pentachlorophenol	66.7	62.5	+4.2	21	27	+6
608935	Pentachlorobenzene	65.7	61.8	+3.9	23	29	+6
191242	Benzo(g,h,i)perylene	64.8	59.0	+5.8	24	34	+10
120821	1,2,4-Trichlorobenzene	63.0	63.9	-0.9	25	25	+0
72435	Methoxychlor	62.0	59.0	+3.0	26	34	+8
71556	1,1,1-Trichloroethane	59.3	67.4	-8.1	27	17	-10
91576	2-Methylnaphthalene	59.3	52.8	+6.5	27	45	+18
83329	Acenaphthene	59.3	59.0	+0.2	27	36	+9
7440360	Antimony	59.3	65.3	-6.0	27	22	-5
7440020	Nickel	58.3	66.7	-8.3	31	20	-11
95943	1,2,4,5-Tetrachlorobenzene	58.3	58.3	+0.0	32	37	+5
319846	Hexachlorocyclohexane, alpha-	58.3	54.2	+4.2	32	43	+11
732263	Phenol, 2,4,6-tris(1,1-dimethylethyl)-	58.3	52.1	+6.3	32	47	+15
959988	Endosulfan, alpha-	57.4	51.4	+6.0	35	50	+15
33213659	Endosulfan, beta-	57.4	51.4	+6.0	35	50	+15
107062	1,2-Dichloroethane	55.6	62.5	-6.9	37	27	-10
106467	1,4-Dichlorobenzene	55.6	56.3	-0.7	37	41	+4
7440417	Beryllium	55.6	58.3	-2.8	37	37	+0
108952	Phenol	55.6	64.6	-9.0	37	23	-14

(continued)

CAS No.	Chemical Name	Final Score	Score with all Criteria	Score Change	Rank	Rank with all Criteria	Rank Change
7782492	Selenium	54.6	57.6	-3.0	41	39	-2
101553	4-Bromophenyl phenyl ether	53.7	50.7	+3.0	42	53	+11
7440666	Zinc	53.7	63.2	-9.5	42	26	-16
75343	1,1-Dichloroethane	51.9	53.5	-1.6	44	44	+0
95501	1,2-Dichlorobenzene	51.9	59.7	-7.9	44	31	-13
541731	1,3-Dichlorobenzene	51.9	51.4	+0.5	44	50	+6
82688	Pentachloronitrobenzene	50.0	50.0	+0.0	47	55	+8
85687	Butyl benzyl phthalate	48.1	50.7	-2.5	48	53	+5
56382	Parathion	48.1	44.4	+3.7	48	60	+12
127184	Tetrachloroethylene	48.1	59.0	-10.9	48	32	-16
79016	Trichloroethylene	48.1	59.0	-10.9	48	32	-16
76448	Heptachlor	47.2	47.9	-0.7	52	57	+5
319857	Hexachlorocyclohexane, beta-	47.2	45.8	+1.4	52	59	+7
7440508	Copper	45.4	56.9	-11.6	54	40	-14
79345	1,1,2,2-Tetrachloroethane	44.4	52.1	-7.6	55	47	-8
77474	Hexachlorocyclopentadiene	44.4	43.8	+0.7	55	62	+7
74884	Iodomethane	44.4	43.8	+0.7	55	62	+7
75092	Methylene chloride	44.4	56.3	-11.8	55	41	-14
98953	Nitrobenzene	44.4	52.1	-7.6	55	47	-8
319868	Hexachlorocyclohexane, delta-	43.5	43.1	+0.5	60	67	+7
132649	Dibenzofuran	41.7	43.8	-2.1	61	62	+1
74839	Bromomethane	39.8	44.4	-4.6	62	60	-2
57125	Cyanide	39.8	52.8	-13.0	62	45	-17
67721	Hexachloroethane	39.8	46.5	-6.7	62	58	-4
298022	Phorate	39.8	42.4	-2.5	62	68	+6
2303175	Triallate	38.9	37.5	+1.4	66	79	+13
630206	1,1,1,2-Tetrachloroethane	37.0	42.4	-5.3	67	68	+1
106934	Ethylene dibromide (EDB)	37.0	40.3	-3.2	67	74	+7
1582098	Trifluralin	37.0	40.3	-3.2	67	74	+7
99650	1,3-Dinitrobenzene	36.1	35.4	+0.7	70	80	+10
119471	2,2'-Methylenebis(4-methyl-6-tert-butylphenol)	36.1	35.4	+0.7	70	80	+10
95954	2,4,5-Trichlorophenol	36.1	39.6	-3.5	70	76	+6
106489	4-Chlorophenol	36.1	35.4	+0.7	70	80	+10
17804352	Benomyl	36.1	35.4	+0.7	70	80	+10
1563662	Carbofuran	36.1	35.4	+0.7	70	80	+10
1675543	Diglycidal ether of Bisphenol A	36.1	35.4	+0.7	70	80	+10
122394	Diphenylamine	36.1	41.7	-5.6	70	71	+1
74908	Hydrocyanic acid	36.1	41.7	-5.6	70	71	+1
96764	Phenol, 2,2-bis(1,1-dimethylethyl)-	36.1	39.6	-3.5	70	76	+6
599644	Phenol, 4-(1-methyl-1-phenylethyl)-	36.1	43.8	-7.6	70	62	-8
25154523	Phenol, nonyl-	36.1	35.4	+0.7	70	80	+10

(continued)

CAS No.	Chemical Name	Final Score	Score with all Criteria	Score Change	Rank	Rank with all Criteria	Rank Change
90437	Phenylphenol, o-	36.1	43.8	-7.6	70	62	-8
75445	Phosgene	36.1	41.7	-5.6	70	71	+1
25973551	2-(2'-Hydroxy-3',5'-(di-t-amyl)phenyl)benzotriazole	33.3	33.3	+0.0	84	89	+5
79743	2,5-Di-(1,1-dimethylpropyl)hydroquinone	33.3	33.3	+0.0	84	89	+5
7005723	4-Chlorophenyl phenyl ether	33.3	33.3	+0.0	84	89	+5
1861401	Benefin	33.3	33.3	+0.0	84	89	+5
115322	Dicofol	33.3	33.3	+0.0	84	89	+5
40487421	Pendimethalin	33.3	33.3	+0.0	84	89	+5
298044	Disulfoton	31.5	31.9	-0.5	90	95	+5
1031078	Endosulfan sulfate	31.5	31.9	-0.5	90	95	+5
298000	Methyl parathion	31.5	34.0	-2.5	90	88	-2
1861321	Dacthal	29.6	30.6	-0.9	93	102	+9
100254	1,4-Dinitrobenzene	27.8	31.3	-3.5	94	97	+3
101144	4,4'-Methylenebis(2-chloroaniline)	27.8	35.4	-7.6	94	80	-14
115297	Endosulfan	26.9	28.5	-1.6	96	105	+9
79061	Acrylamide	25.0	31.3	-6.3	97	97	+0
56038892	Benzenamine, N-(1-ethylpropyl)-3,4-dimethyl-	22.2	25.0	-2.8	98	109	+11
1689992	Bromoxynil octanoate	22.2	25.0	-2.8	98	109	+11
5598130	Chlorpyrifos methyl	22.2	25.0	-2.8	98	109	+11
78488	DEF	22.2	25.0	-2.8	98	109	+11
333415	Diazinon	22.2	29.2	-6.9	98	103	+5
9003536	Polystyrene	22.2	25.0	-2.8	98	109	+11
7439965	Manganese	22.2	48.1	-25.9	104	56	-48
119904	3,3'-Dimethoxybenzidine	19.4	20.8	-1.4	105	120	+15
116063	Aldicarb	19.4	22.9	-3.5	105	117	+12
107186	Allyl alcohol	19.4	31.3	-11.8	105	97	-8
60515	Dimethoate	19.4	22.9	-3.5	105	117	+12
54115	Nicotinea	19.4	27.1	-7.6	105	107	+2
137268	Thiram	19.4	25.0	-5.6	105	109	+4
7429905	Aluminum	18.5	38.9	-20.4	111	78	-33
107028	Acrolein	16.7	27.1	-10.4	112	107	-5
75218	Ethylene oxide	16.7	31.3	-14.6	112	97	-15
1912249	Atrazine	14.8	27.8	-13.0	114	106	-8
7440484	Cobalt	12.5	41.7	-29.2	115	70	-45
7440622	Vanadium	12.5	30.6	-18.1	115	101	-14
528290	1,2-Dinitrobenzene	11.1	16.7	-5.6	117	125	+8
99309	2,6-Dichloro-4-nitroaniline	11.1	16.7	-5.6	117	125	+8
128370	2,6-Di-tert-butyl-p-cresol	11.1	25.0	-13.9	117	109	-8
99592	2-Methoxy-5-nitrobenzenamine	11.1	8.3	+2.8	117	149	+32
97563	2-Methyl-4-((2-methylphenyl)azo)benzenamine	11.1	12.5	-1.4	117	145	+28
20325400	3,3'-Dimethyoxybenzidine dihydrochloride	11.1	16.7	-5.6	117	125	+8

(continued)

CAS No.	Chemical Name	Final Score	Score with all Criteria	Score Change	Rank	Rank with all Criteria	Rank Change
60093	4-(Phenylazo)benzenamine	11.1	16.7	-5.6	117	125	+8
101779	4,4'-Methylenebisbenzenamine	11.1	20.8	-9.7	117	120	+3
101688	4,4'-Methylenediphenyl isocyanate	11.1	16.7	-5.6	117	125	+8
101804	4,4'-Oxybisbenzenamine	11.1	16.7	-5.6	117	125	+8
96695	4,4'-Thiobis(6-tert-butyl-m-cresol)	11.1	16.7	-5.6	117	125	+8
834128	Ametryn	11.1	16.7	-5.6	117	125	+8
569642	Basic green 4	11.1	8.3	+2.8	117	149	+32
90948	Bis(4-(dimethylamino)phenyl)methanone	11.1	16.7	-5.6	117	125	+8
2832408	C.I. Disperse yellow 3	11.1	16.7	-5.6	117	125	+8
79118	Chloroacetic acid	11.1	25.0	-13.9	117	109	-8
1897456	Chlorthalonil	11.1	20.8	-9.7	117	120	+3
1163195	Decabromodiphenyl oxide	11.1	29.2	-18.1	117	103	-14
330552	Linuron	11.1	16.7	-5.6	117	125	+8
111659	Octane	11.1	16.7	-5.6	117	125	+8
92842	Phenothiazine	11.1	16.7	-5.6	117	125	+8
88891	Picric acid	11.1	20.8	-9.7	117	120	+3
5468757	Pigment yellow 14	11.1	16.7	-5.6	117	125	+8
1929824	Pyridine, 2-chloro-6-(trichloromethyl)-	11.1	16.7	-5.6	117	125	+8
122349	Simazine	11.1	16.7	-5.6	117	125	+8
13071799	Terbufos	11.1	20.8	-9.7	117	120	+3
961115	Tetrachlorvinphos	11.1	16.7	-5.6	117	125	+8
639587	Triphenyltin chloride	11.1	16.7	-5.6	117	125	+8
1120214	Undecane	11.1	16.7	-5.6	117	125	+8
91941	3,3'-Dichlorobenzidine	8.3	14.6	-6.3	146	144	-2
75070	Acetaldehyde	8.3	22.9	-14.6	146	117	-29
314409	Bromoacil	0.0	11.1	-11.1	148	146	-2
42874033	Oxyfluorfen	0.0	11.1	-11.1	148	146	-2
56359	Tributyltin oxide	0.0	11.1	-11.1	148	146	-2

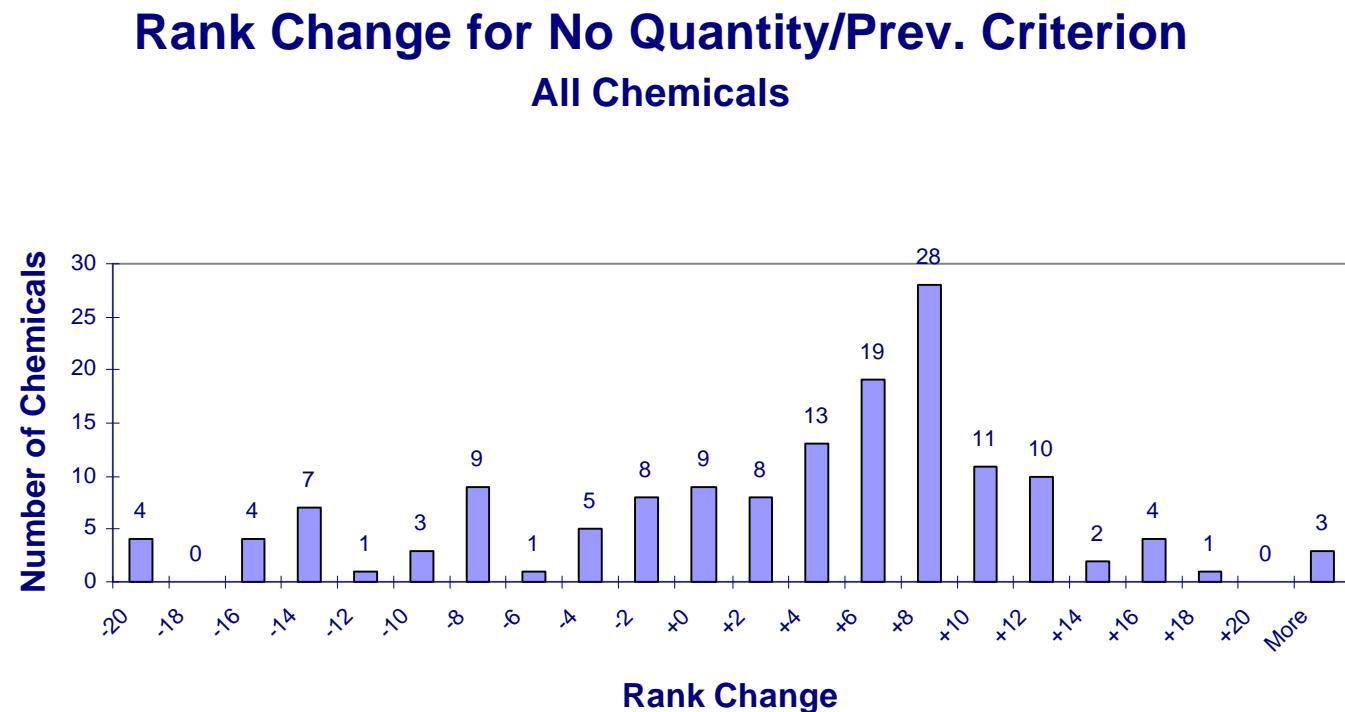


Figure 7

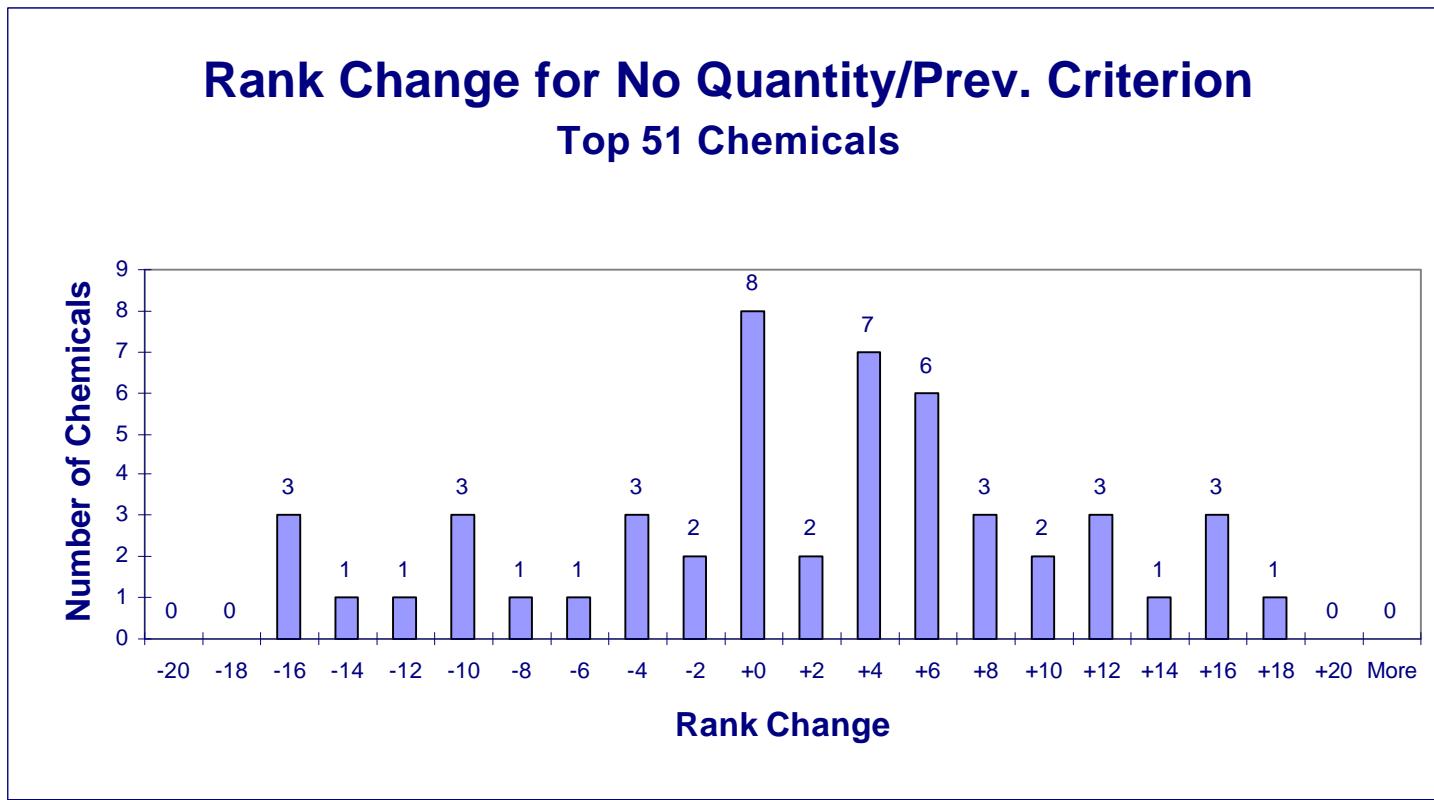


Figure 8

Table 5: Ranking without Environmental Presence or RCRA Relevance Criteria

CAS No.	Chemical Name	Final Score	Score with all Criteria	Score Change	Rank	Rank with all Criteria	Rank Change
7440484	Cobalt	100.0	41.7	+58.3	1	70	+69
7439921	Lead	100.0	94.4	+5.6	1	1	+0
7439965	Manganese	100.0	48.1	+51.9	1	56	+55
N590	Polycyclic aromatic compounds	100.0	91.7	+8.3	1	2	+1
7440439	Cadmium	91.7	90.3	+1.4	5	3	-2
7439976	Mercury	87.5	88.2	-0.7	6	5	-1
85018	Phenanthrene	83.3	68.1	+15.3	7	16	+9
95943	1,2,4,5-Tetrachlorobenzene	79.2	58.3	+20.8	8	37	+29
117840	Di-n-octyl phthalate	79.2	70.1	+9.0	8	13	+5
86737	Fluorene	79.2	78.5	+0.7	8	6	-2
1336363	Polychlorinated biphenyls	79.2	89.6	-10.4	8	4	-4
117817	Bis(2-ethylhexyl)phthalate	75.0	76.4	-1.4	12	8	-4
206440	Fluoranthene	75.0	76.4	-1.4	12	8	-4
58899	gamma-hexachlorocyclohexane	75.0	64.6	+10.4	12	23	+11
118741	Hexachlorobenzene	75.0	67.4	+7.6	12	17	+5
87683	Hexachlorobutadiene	75.0	70.8	+4.2	12	12	+0
72435	Methoxychlor	75.0	59.0	+16.0	12	34	+22
608935	Pentachlorobenzene	75.0	61.8	+13.2	12	29	+17
82688	Pentachloronitrobenzene	75.0	50.0	+25.0	12	55	+43
7440224	Silver	75.0	69.4	+5.6	12	15	+3
1582098	Trifluralin	75.0	40.3	+34.7	12	74	+62
101553	4-Bromophenyl phenyl ether	70.8	50.7	+20.1	22	53	+31
191242	Benzo(g,h,i)perylene	70.8	59.0	+11.8	22	34	+12
1024573	Heptachlor epoxide	70.8	61.8	+9.0	22	30	+8
120821	1,2,4-Trichlorobenzene	66.7	63.9	+2.8	25	25	+0
25973551	2-(2'-Hydroxy-3',5'-(di-t-amyl)phenyl)benzotriazole	66.7	33.3	+33.3	25	89	+64
79743	2,5-Di-(1,1-dimethylpropyl)hydroquinone	66.7	33.3	+33.3	25	89	+64
7429905	Aluminum	66.7	38.9	+27.8	25	78	+53
1861401	Benefin	66.7	33.3	+33.3	25	89	+64
7440473	Chromium	66.7	77.8	-11.1	25	7	-18
84742	Dibutyl phthalate	66.7	66.7	+0.0	25	20	-5
115322	Dicofol	66.7	33.3	+33.3	25	89	+64
959988	Endosulfan, alpha-	66.7	51.4	+15.3	25	50	+25
33213659	Endosulfan, beta-	66.7	51.4	+15.3	25	50	+25
40487421	Pendimethalin	66.7	33.3	+33.3	25	89	+64
732263	Phenol, 2,4,6-tris(1,1-dimethylethyl)-	66.7	52.1	+14.6	25	47	+22
7440622	Vanadium	66.7	30.6	+36.1	25	101	+76
71556	1,1,1-Trichloroethane	62.5	67.4	-4.9	38	17	-21
120127	Anthracene	62.5	67.4	-4.9	38	17	-21
7440508	Copper	62.5	56.9	+5.6	38	40	+2

(continued)

CAS No.	Chemical Name	Final Score	Score with all Criteria	Score Change	Rank	Rank with all Criteria	Rank Change
57125	Cyanide	62.5	52.8	+9.7	38	45	+7
91203	Naphthalene	62.5	72.9	-10.4	38	11	-27
7440020	Nickel	62.5	66.7	-4.2	38	20	-18
108952	Phenol	62.5	64.6	-2.1	38	23	-15
129000	Pyrene	62.5	70.1	-7.6	38	13	-25
7440666	Zinc	62.5	63.2	-0.7	38	26	-12
132649	Dibenzofuran	58.3	43.8	+14.6	47	62	+15
87865	Pentachlorophenol	58.3	62.5	-4.2	47	27	-20
95501	1,2-Dichlorobenzene	58.3	59.7	-1.4	49	31	-18
107062	1,2-Dichloroethane	58.3	62.5	-4.2	49	27	-22
7440360	Antimony	58.3	65.3	-6.9	49	22	-27
7440382	Arsenic	58.3	73.6	-15.3	49	10	-39
1163195	Decabromodiphenyl oxide	58.3	29.2	+29.2	49	103	+54
319846	Hexachlorocyclohexane, alpha-	54.2	54.2	+0.0	54	43	-11
98953	Nitrobenzene	54.2	52.1	+2.1	54	47	-7
128370	2,6-Di-tert-butyl-p-cresol	50.0	25.0	+25.0	56	109	+53
107186	Allyl alcohol	50.0	31.3	+18.8	56	97	+41
1912249	Atrazine	50.0	27.8	+22.2	56	106	+50
56038892	Benzenamine, N-(1-ethylpropyl)-3,4-dimethyl-	50.0	25.0	+25.0	56	109	+53
7440417	Beryllium	50.0	58.3	-8.3	56	37	-19
1689992	Bromoxynil octanoate	50.0	25.0	+25.0	56	109	+53
79118	Chloroacetic acid	50.0	25.0	+25.0	56	109	+53
5598130	Chlorpyrifos methyl	50.0	25.0	+25.0	56	109	+53
1861321	Dacthal	50.0	30.6	+19.4	56	102	+46
78488	DEF	50.0	25.0	+25.0	56	109	+53
67721	Hexachloroethane	50.0	46.5	+3.5	56	58	+2
599644	Phenol, 4-(1-methyl-1-phenylethyl)-	50.0	43.8	+6.3	56	62	+6
90437	Phenylphenol, o-	50.0	43.8	+6.3	56	62	+6
9003536	Polystyrene	50.0	25.0	+25.0	56	109	+53
7782492	Selenium	50.0	57.6	-7.6	56	39	-17
2303175	Triallate	50.0	37.5	+12.5	56	79	+23
75343	1,1-Dichloroethane	45.8	53.5	-7.6	72	44	-28
106467	1,4-Dichlorobenzene	45.8	56.3	-10.4	72	41	-31
101144	4,4'-Methylenebis(2-chloroaniline)	45.8	35.4	+10.4	72	80	+8
83329	Acenaphthene	45.8	59.0	-13.2	72	36	-36
74839	Bromomethane	45.8	44.4	+1.4	72	60	-12
85687	Butyl benzyl phthalate	45.8	50.7	-4.9	72	53	-19
122394	Diphenylamine	45.8	41.7	+4.2	72	71	-1
74908	Hydrocyanic acid	45.8	41.7	+4.2	72	71	-1
75092	Methylene chloride	45.8	56.3	-10.4	72	41	-31
75445	Phosgene	45.8	41.7	+4.2	72	71	-1

(continued)

CAS No.	Chemical Name	Final Score	Score with all Criteria	Score Change	Rank	Rank with all Criteria	Rank Change
127184	Tetrachloroethylene	45.8	59.0	-13.2	72	32	-40
79016	Trichloroethylene	45.8	59.0	-13.2	72	32	-40
541731	1,3-Dichlorobenzene	41.7	51.4	-9.7	84	50	-34
95954	2,4,5-Trichlorophenol	41.7	39.6	+2.1	84	76	-8
101779	4,4'-Methylenebisbenzenamine	41.7	20.8	+20.8	84	120	+36
1897456	Chlorthalonil	41.7	20.8	+20.8	84	120	+36
333415	Diazinon	41.7	29.2	+12.5	84	103	+19
76448	Heptachlor	41.7	47.9	-6.2	84	57	-27
54115	Nicotinea	41.7	27.1	+14.6	84	107	+23
96764	Phenol, 2,2-bis(1,1-dimethylethyl)-	41.7	39.6	+2.1	84	76	-8
298022	Phorate	41.7	42.4	-0.7	84	68	-16
88891	Picric acid	41.7	20.8	+20.8	84	120	+36
13071799	Terbufos	41.7	20.8	+20.8	84	120	+36
79345	1,1,2,2-Tetrachloroethane	37.5	52.1	-14.6	95	47	-48
100254	1,4-Dinitrobenzene	37.5	31.3	+6.3	95	97	+2
75218	Ethylene oxide	37.5	31.3	+6.3	95	97	+2
319857	Hexachlorocyclohexane, beta-	37.5	45.8	-8.3	95	59	-36
319868	Hexachlorocyclohexane, delta-	37.5	43.1	-5.6	95	67	-28
77474	Hexachlorocyclopentadiene	37.5	43.8	-6.3	95	62	-33
74884	Iodomethane	37.5	43.8	-6.3	95	62	-33
298000	Methyl parathion	37.5	34.0	+3.5	95	88	-7
137268	Thiram	37.5	25.0	+12.5	95	109	+14
528290	1,2-Dinitrobenzene	33.3	16.7	+16.7	104	125	+21
99650	1,3-Dinitrobenzene	33.3	35.4	-2.1	104	80	-24
119471	2,2'-Methylenebis(4-methyl-6-tert-butylphenol)	33.3	35.4	-2.1	104	80	-24
99309	2,6-Dichloro-4-nitroaniline	33.3	16.7	+16.7	104	125	+21
91576	2-Methylnaphthalene	33.3	52.8	-19.4	104	45	-59
20325400	3,3'-Dimethyloxybenzidine dihydrochloride	33.3	16.7	+16.7	104	125	+21
60093	4-(Phenylazo)benzenamine	33.3	16.7	+16.7	104	125	+21
101688	4,4'-Methylenediphenyl isocyanate	33.3	16.7	+16.7	104	125	+21
101804	4,4'-Oxybisbenzenamine	33.3	16.7	+16.7	104	125	+21
96695	4,4'-Thiobis(6-tert-butyl-m-cresol)	33.3	16.7	+16.7	104	125	+21
106489	4-Chlorophenol	33.3	35.4	-2.1	104	80	-24
75070	Acetaldehyde	33.3	22.9	+10.4	104	117	+13
116063	Aldicarb	33.3	22.9	+10.4	104	117	+13
834128	Ametryn	33.3	16.7	+16.7	104	125	+21
17804352	Benomyl	33.3	35.4	-2.1	104	80	-24
90948	Bis(4-(dimethylamino)phenyl)methanone	33.3	16.7	+16.7	104	125	+21
314409	Bromoacil	33.3	11.1	+22.2	104	146	+42
2832408	C.I. Disperse yellow 3	33.3	16.7	+16.7	104	125	+21
1563662	Carbofuran	33.3	35.4	-2.1	104	80	-24

(continued)

CAS No.	Chemical Name	Final Score	Score with all Criteria	Score Change	Rank	Rank with all Criteria	Rank Change
1675543	Diglycidal ether of Bisphenol A	33.3	35.4	-2.1	104	80	-24
60515	Dimethoate	33.3	22.9	+10.4	104	117	+13
298044	Disulfoton	33.3	31.9	+1.4	104	95	-9
115297	Endosulfan	33.3	28.5	+4.9	104	105	+1
1031078	Endosulfan sulfate	33.3	31.9	+1.4	104	95	-9
330552	Linuron	33.3	16.7	+16.7	104	125	+21
111659	Octane	33.3	16.7	+16.7	104	125	+21
42874033	Oxyfluorfen	33.3	11.1	+22.2	104	146	+42
56382	Parathion	33.3	44.4	-11.1	104	60	-44
25154523	Phenol, nonyl-	33.3	35.4	-2.1	104	80	-24
92842	Phenothiazine	33.3	16.7	+16.7	104	125	+21
5468757	Pigment yellow 14	33.3	16.7	+16.7	104	125	+21
1929824	Pyridine, 2-chloro-6-(trichloromethyl)-	33.3	16.7	+16.7	104	125	+21
122349	Simazine	33.3	16.7	+16.7	104	125	+21
961115	Tetrachlorvinphos	33.3	16.7	+16.7	104	125	+21
56359	Tributyltin oxide	33.3	11.1	+22.2	104	146	+42
639587	Triphenyltin chloride	33.3	16.7	+16.7	104	125	+21
1120214	Undecane	33.3	16.7	+16.7	104	125	+21
630206	1,1,1,2-Tetrachloroethane	29.2	42.4	-13.2	141	68	-73
119904	3,3'-Dimethoxybenzidine	29.2	20.8	+8.3	141	120	-21
107028	Acrolein	29.2	27.1	+2.1	141	107	-34
97563	2-Methyl-4-((2-methylphenyl)azo)benzenamine	25.0	12.5	+12.5	144	145	+1
79061	Acrylamide	25.0	31.3	-6.3	144	97	-47
106934	Ethylene dibromide (EDB)	25.0	40.3	-15.3	144	74	-70
99592	2-Methoxy-5-nitrobenzenamine	16.7	8.3	+8.3	147	149	+2
91941	3,3'-Dichlorobenzidine	16.7	14.6	+2.1	147	144	-3
7005723	4-Chlorophenyl phenyl ether	16.7	33.3	-16.7	147	89	-58
569642	Basic green 4	16.7	8.3	+8.3	147	149	+2

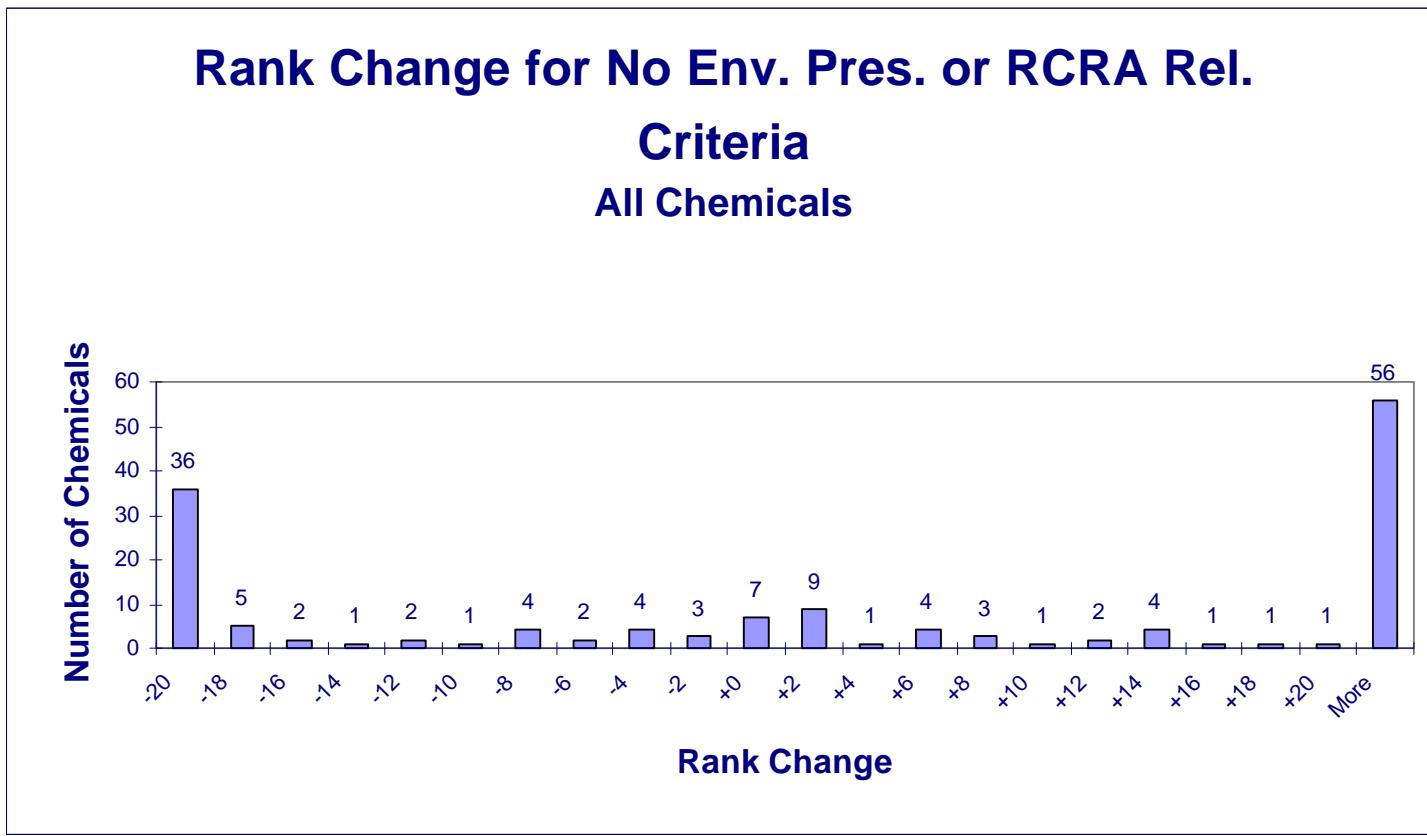


Figure 9

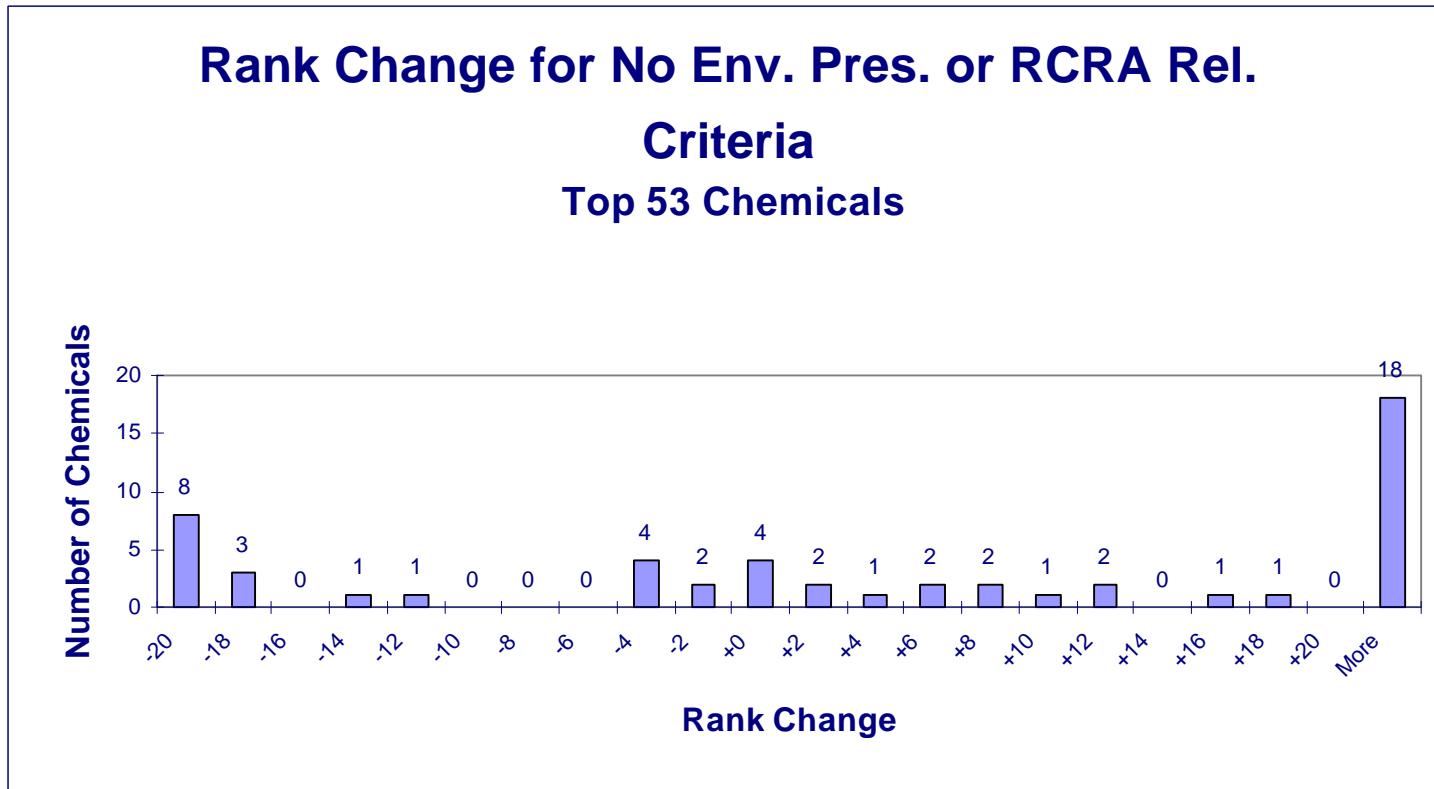


Figure 10

manganese and cobalt moved to the top of the list. This is because both of these chemicals have incomplete PBT scores in the WMPT, so that with both environmental presence and RCRA dropped they were ranked entirely based on quantity and prevalence. Twenty-seven chemicals moved between the top 50 group and the remainder of the chemical list - 14 chemicals moved into the top 50 and 13 dropped out. Eleven chemicals moved up more than 50 ranks to get into the top 50.

3.3 Sensitivity to Fenceline Selection

In the original ranking method fenceline determinations were made based on judgement rather than the rigid application of a specific predefined rule. Since several of the fencelines could have been reasonably set at different values, it was determined that the affect on ranking of an alternative set of fencelines should be explored. Fencelines were used for subcriteria related to Environmental Presence and to Quantity/Prevalence. It was decided that a rule would be applied for fenceline selection - that the groupings would be split into equal groups based on percentiles of the quantity distributions. Since these were originally scored on a 0, 1, 2, 3 scale, 4 equal groupings were developed. Due to the nature of the distribution of data for the Environmental Presence subcriteria, splitting the distribution into 4 equal groupings was frequently not possible. Since the fencelines for the Environmental Presence subcriteria appeared reasonable and defensible, we focused on the Quantity/Prevalence subcriteria. Using the PERCENTILE function in MS Excel, the fencelines for the data were determined using the 25, 50, and 75 percentile values.

Fenceline values for each distribution are given in Table 6. The relative closeness in value of the BRS Quantity fencelines reflects the fact that much of the BRS quantity data for CCL chemicals were bunched together in the range of 40 - 70 million tons. Several of the other fenceline values are within the same order of magnitude as the values originally chosen. This is because part of the judgement basis for selecting fencelines originally was to consider creating roughly equal-size groupings.

The results of altering the fenceline values for Quantity/Persistence subcriteria are shown in Table 7 and Figures 11 and 12. The fenceline changes had only a modest affect on the chemical rankings. None of the top 35 chemicals changed more than 6 ranks, and only 1 of the top 50 chemicals changed more than 10 ranks. Most rank changes for chemicals were on the order of 8 or fewer places up or down. Four chemicals moved between the top 50 group and the remainder of the chemical list - 1 chemicals moved into the top 50 and 3 dropped out.

Table 6. Fenceline Values for Quantity/Prevalence Subcriteria

Subcriterion	New Fenceline Values	Original Fenceline Values
BRS Quantity	49,382,029.4 tons	10,000 tons
	50,990,912.5	10,000,000
	75,491,795.3	100,000,000
BRS Generators	137 generators	100 generators
	549	1,000
	11,211	10,000
TRI Quantity	29,626 pounds	100 pounds
	761,442	1,000,000
	7,077,331	10,000,000
TRI Generators	4 generators	5 generators
	16	10
	70	100
NHWCS Quantity	459.6 pounds	100 pounds
	61,923.4	100,000
	1,461,539.3	1,000,000
NHWCS Handlers	1 handler	2 handlers
	4	5
	13	10

Table 7: Ranking with Revised Fencelines

CAS No.	Chemical Name	Final Score	Final Score with Old Fencelines	Score Change	Rank	Rank with old Fencelines	Rank Change
7439921	Lead	94.4	94.4	+0.0	1	1	+0
7440439	Cadmium	92.4	90.3	+2.1	2	3	+1
N590	Polycyclic aromatic compounds	91.7	91.7	+0.0	3	2	-1
7439976	Mercury	90.3	88.2	+2.1	4	5	+1
1336363	Polychlorinated biphenyls	89.6	89.6	+0.0	5	4	-1
86737	Fluorene	80.6	78.5	+2.1	6	6	+0
7440473	Chromium	77.8	77.8	+0.0	7	7	+0
117817	Bis(2-ethylhexyl)phthalate	76.4	76.4	+0.0	8	8	+0
7440382	Arsenic	75.7	73.6	+2.1	9	10	+1
91203	Naphthalene	75.0	72.9	+2.1	10	11	+1
7440224	Silver	75.0	69.4	+5.6	10	15	+5
87683	Hexachlorobutadiene	72.9	70.8	+2.1	12	12	+0
117840	Di-n-octyl phthalate	72.2	70.1	+2.1	13	13	+0
206440	Fluoranthene	72.2	76.4	-4.2	14	8	-6
129000	Pyrene	70.1	70.1	+0.0	15	13	-2
71556	1,1,1-Trichloroethane	69.4	67.4	+2.1	16	17	+1
120127	Anthracene	69.4	67.4	+2.1	16	17	+1
7440360	Antimony	69.4	65.3	+4.2	16	22	+6
7440020	Nickel	68.8	66.7	+2.1	19	20	+1
85018	Phenanthrene	68.1	68.1	+0.0	20	16	-4
118741	Hexachlorobenzene	67.4	67.4	+0.0	21	17	-4
107062	1,2-Dichloroethane	66.7	62.5	+4.2	22	27	+5
84742	Dibutyl phthalate	66.7	66.7	+0.0	22	20	-2
108952	Phenol	66.7	64.6	+2.1	22	23	+1
7440666	Zinc	65.3	63.2	+2.1	25	26	+1
120821	1,2,4-Trichlorobenzene	63.9	63.9	+0.0	26	25	-1
58899	gamma-hexachlorocyclohexane	62.5	64.6	-2.1	27	23	-4
95501	1,2-Dichlorobenzene	61.8	59.7	+2.1	28	31	+3
608935	Pentachlorobenzene	61.8	61.8	+0.0	28	29	+1
127184	Tetrachloroethylene	61.1	59.0	+2.1	30	32	+2
79016	Trichloroethylene	61.1	59.0	+2.1	30	32	+2
7440417	Beryllium	60.4	58.3	+2.1	32	37	+5
87865	Pentachlorophenol	60.4	62.5	-2.1	32	27	-5
7440508	Copper	59.0	56.9	+2.1	34	40	+6
95943	1,2,4,5-Tetrachlorobenzene	58.3	58.3	+0.0	35	37	+2
75092	Methylene chloride	58.3	56.3	+2.1	36	41	+5
1024573	Heptachlor epoxide	57.6	61.8	-4.2	37	30	-7

(continued)

CAS No.	Chemical Name	Final Score	Final Score with Old Fencelines	Score Change	Rank	Rank with old Fencelines	Rank Change
7782492	Selenium	57.6	57.6	+0.0	37	39	+2
83329	Acenaphthene	56.9	59.0	-2.1	39	36	-3
98953	Nitrobenzene	56.3	52.1	+4.2	40	47	+7
732263	Phenol, 2,4,6-tris(1,1-dimethylethyl)-	56.3	52.1	+4.2	40	47	+7
106467	1,4-Dichlorobenzene	56.3	56.3	+0.0	42	41	-1
72435	Methoxychlor	54.9	59.0	-4.2	43	34	-9
319846	Hexachlorocyclohexane, alpha-	54.2	54.2	+0.0	44	43	-1
75343	1,1-Dichloroethane	53.5	53.5	+0.0	45	44	-1
191242	Benzo(g,h,i)perylene	52.8	59.0	-6.2	46	34	-12
57125	Cyanide	52.8	52.8	+0.0	46	45	-1
79345	1,1,2,2-Tetrachloroethane	52.1	52.1	+0.0	48	47	-1
85687	Butyl benzyl phthalate	48.6	50.7	-2.1	49	53	+4
91576	2-Methylnaphthalene	48.6	52.8	-4.2	50	45	-5
7439965	Manganese	48.1	48.1	+0.0	51	56	+5
82688	Pentachloronitrobenzene	47.9	50.0	-2.1	52	55	+3
541731	1,3-Dichlorobenzene	47.2	51.4	-4.2	53	50	-3
959988	Endosulfan, alpha-	47.2	51.4	-4.2	53	50	-3
33213659	Endosulfan, beta-	47.2	51.4	-4.2	53	50	-3
67721	Hexachloroethane	46.5	46.5	+0.0	56	58	+2
101553	4-Bromophenyl phenyl ether	44.4	50.7	-6.3	57	53	-4
132649	Dibenzofuran	43.8	43.8	+0.0	58	62	+4
319857	Hexachlorocyclohexane, beta-	43.8	45.8	-2.1	58	59	+1
599644	Phenol, 4-(1-methyl-1-phenylethyl)-	43.8	43.8	+0.0	58	62	+4
90437	Phenylphenol, o-	43.8	43.8	+0.0	58	62	+4
319868	Hexachlorocyclohexane, delta-	43.1	43.1	+0.0	62	67	+5
630206	1,1,1,2-Tetrachloroethane	42.4	42.4	+0.0	63	68	+5
74839	Bromomethane	42.4	44.4	-2.1	63	60	-3
7440484	Cobalt	41.7	41.7	+0.0	65	70	+5
76448	Heptachlor	41.7	47.9	-6.3	66	57	-9
77474	Hexachlorocyclopentadiene	41.7	43.8	-2.1	66	62	-4
74884	Iodomethane	41.7	43.8	-2.1	66	62	-4
1582098	Trifluralin	40.3	40.3	+0.0	69	74	+5
122394	Diphenylamine	39.6	41.7	-2.1	70	71	+1
96764	Phenol, 2,2-bis(1,1-dimethylethyl)-	39.6	39.6	+0.0	70	76	+6
7429905	Aluminum	38.9	38.9	+0.0	72	78	+6
56382	Parathion	38.2	44.4	-6.2	73	60	-13
106934	Ethylene dibromide (EDB)	38.2	40.3	-2.1	74	74	+0
298022	Phorate	38.2	42.4	-4.2	74	68	-6

(continued)

CAS No.	Chemical Name	Final Score	Final Score with Old Fencelines	Score Change	Rank	Rank with old Fencelines	Rank Change
95954	2,4,5-Trichlorophenol	37.5	39.6	-2.1	76	76	+0
74908	Hydrocyanic acid	37.5	41.7	-4.2	76	71	-5
75445	Phosgene	37.5	41.7	-4.2	76	71	-5
106489	4-Chlorophenol	35.4	35.4	+0.0	79	80	+1
25154523	Phenol, nonyl-	35.4	35.4	+0.0	79	80	+1
40487421	Pendimethalin	33.3	33.3	+0.0	81	89	+8
7440622	Vanadium	33.3	30.6	+2.8	81	101	+20
99650	1,3-Dinitrobenzene	31.3	35.4	-4.2	83	80	-3
119471	2,2'-Methylenebis(4-methyl-6-tert-butylphenol)	31.3	35.4	-4.2	83	80	-3
101144	4,4'-Methylenebis(2-chloroaniline)	31.3	35.4	-4.2	83	80	-3
79061	Acrylamide	31.3	31.3	+0.0	83	97	+14
1563662	Carbofuran	31.3	35.4	-4.2	83	80	-3
1675543	Diglycidal ether of Bisphenol A	31.3	35.4	-4.2	83	80	-3
75218	Ethylene oxide	31.3	31.3	+0.0	83	97	+14
2303175	Triallate	31.3	37.5	-6.3	90	79	-11
25973551	2-(2'-Hydroxy-3',5'-(di-t-amyl)phenyl)benzotriazole	29.2	33.3	-4.2	91	89	-2
79743	2,5-Di-(1,1-dimethylpropyl)hydroquinone	29.2	33.3	-4.2	91	89	-2
7005723	4-Chlorophenyl phenyl ether	29.2	33.3	-4.2	91	89	-2
1861401	Benefin	29.2	33.3	-4.2	91	89	-2
115322	Dicofol	29.2	33.3	-4.2	91	89	-2
17804352	Benomyl	29.2	35.4	-6.3	96	80	-16
56038892	Benzenamine, N-(1-ethylpropyl)-3,4-dimethyl-	29.2	25.0	+4.2	96	109	+13
1163195	Decabromodiphenyl oxide	29.2	29.2	+0.0	96	103	+7
333415	Diazinon	29.2	29.2	+0.0	96	103	+7
1912249	Atrazine	27.8	27.8	+0.0	100	106	+6
298044	Disulfoton	27.8	31.9	-4.2	100	95	-5
1031078	Endosulfan sulfate	27.8	31.9	-4.2	100	95	-5
298000	Methyl parathion	27.8	34.0	-6.2	100	88	-12
107186	Allyl alcohol	27.1	31.3	-4.2	104	97	-7
1861321	Dacthal	26.4	30.6	-4.2	105	102	-3
128370	2,6-Di-tert-butyl-p-cresol	25.0	25.0	+0.0	106	109	+3
107028	Acrolein	25.0	27.1	-2.1	106	107	+1
79118	Chloroacetic acid	25.0	25.0	+0.0	106	109	+3
9003536	Polystyrene	25.0	25.0	+0.0	106	109	+3
115297	Endosulfan	24.3	28.5	-4.2	110	105	-5
100254	1,4-Dinitrobenzene	22.9	31.3	-8.3	111	97	-14
54115	Nicotinea	22.9	27.1	-4.2	111	107	-4
101779	4,4'-Methylenebisbenzenamine	20.8	20.8	+0.0	113	120	+7

(continued)

CAS No.	Chemical Name	Final Score	Final Score with Old Fencelines	Score Change	Rank	Rank with old Fencelines	Rank Change
1689992	Bromoxynil octanoate	20.8	25.0	-4.2	113	109	-4
5598130	Chlorpyrifos methyl	20.8	25.0	-4.2	113	109	-4
1897456	Chlorthalonil	20.8	20.8	+0.0	113	120	+7
88891	Picric acid	20.8	20.8	+0.0	113	120	+7
13071799	Terbufos	20.8	20.8	+0.0	113	120	+7
137268	Thiram	20.8	25.0	-4.2	113	109	-4
75070	Acetaldehyde	18.8	22.9	-4.2	120	117	-3
101688	4,4'-Methylenediphenyl isocyanate	16.7	16.7	+0.0	121	125	+4
834128	Ametryn	16.7	16.7	+0.0	121	125	+4
78488	DEF	16.7	25.0	-8.3	121	109	-12
60515	Dimethoate	16.7	22.9	-6.3	121	117	-4
111659	Octane	16.7	16.7	+0.0	121	125	+4
92842	Phenothiazine	16.7	16.7	+0.0	121	125	+4
122349	Simazine	16.7	16.7	+0.0	121	125	+4
961115	Tetrachlorvinphos	16.7	16.7	+0.0	121	125	+4
119904	3,3'-Dimethoxybenzidine	14.6	20.8	-6.3	129	120	-9
116063	Aldicarb	14.6	22.9	-8.3	129	117	-12
528290	1,2-Dinitrobenzene	12.5	16.7	-4.2	131	125	-6
99309	2,6-Dichloro-4-nitroaniline	12.5	16.7	-4.2	131	125	-6
20325400	3,3'-Dimethoxybenzidine dihydrochloride	12.5	16.7	-4.2	131	125	-6
101804	4,4'-Oxybisbenzenamine	12.5	16.7	-4.2	131	125	-6
96695	4,4'-Thiobis(6-tert-butyl-m-cresol)	12.5	16.7	-4.2	131	125	-6
330552	Linuron	12.5	16.7	-4.2	131	125	-6
5468757	Pigment yellow 14	12.5	16.7	-4.2	131	125	-6
1929824	Pyridine, 2-chloro-6-(trichloromethyl)-	12.5	16.7	-4.2	131	125	-6
1120214	Undecane	12.5	16.7	-4.2	131	125	-6
314409	Bromoacil	11.1	11.1	+0.0	140	146	+6
91941	3,3'-Dichlorobenzidine	8.3	14.6	-6.3	141	144	+3
99592	2-Methoxy-5-nitrobenzenamine	8.3	8.3	+0.0	142	149	+7
97563	2-Methyl-4-((2-methylphenyl)azo)benzenamine	8.3	12.5	-4.2	142	145	+3
60093	4-(Phenylazo)benzenamine	8.3	16.7	-8.3	142	125	-17
569642	Basic green 4	8.3	8.3	+0.0	142	149	+7
90948	Bis(4-(dimethylamino)phenyl)methanone	8.3	16.7	-8.3	142	125	-17
2832408	C.I. Disperse yellow 3	8.3	16.7	-8.3	142	125	-17
639587	Triphenyltin chloride	8.3	16.7	-8.3	142	125	-17
42874033	Oxyfluorfen	0.0	11.1	-11.1	149	146	-3
56359	Tributyltin oxide	0.0	11.1	-11.1	149	146	-3

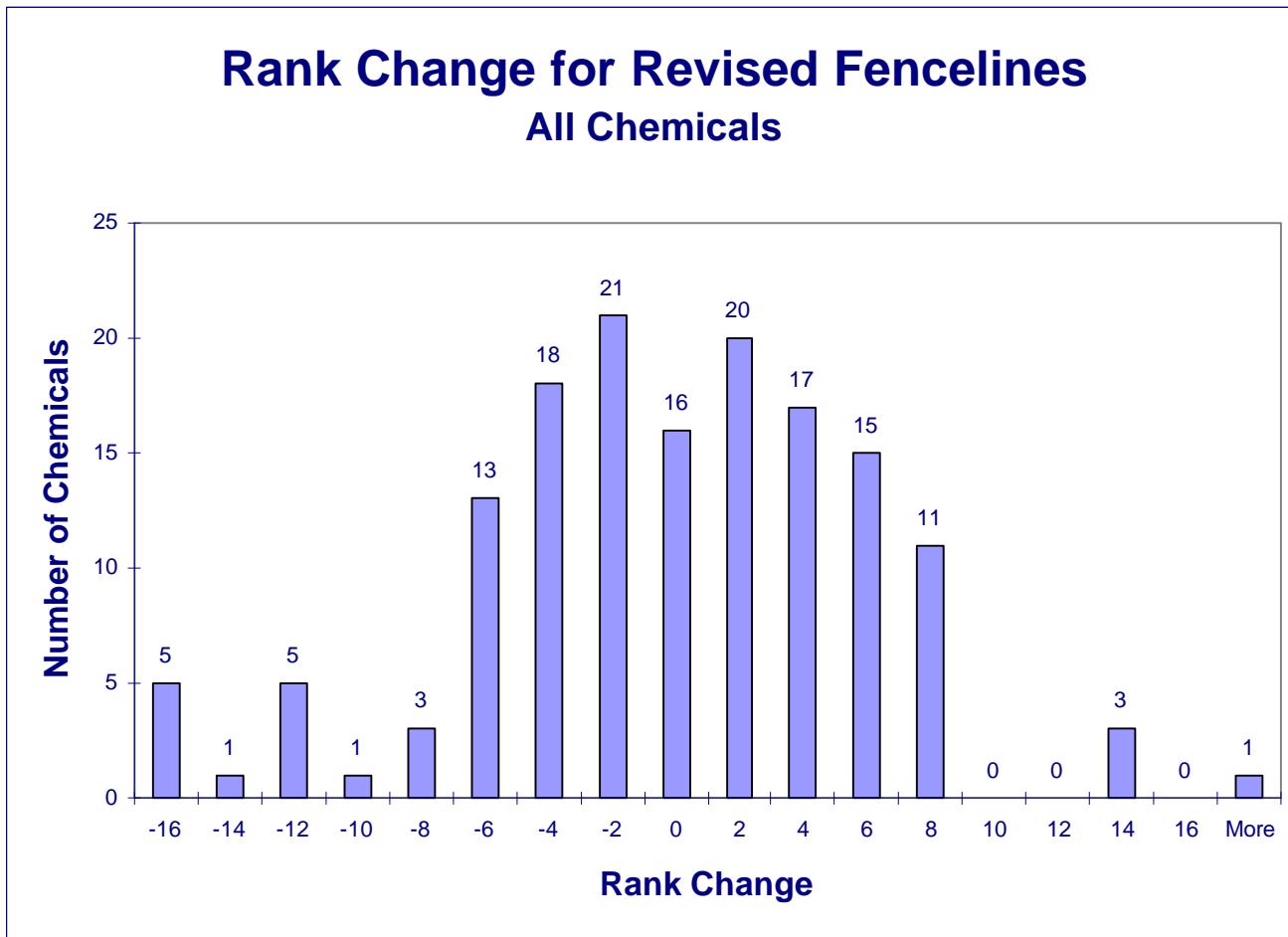


Figure 11

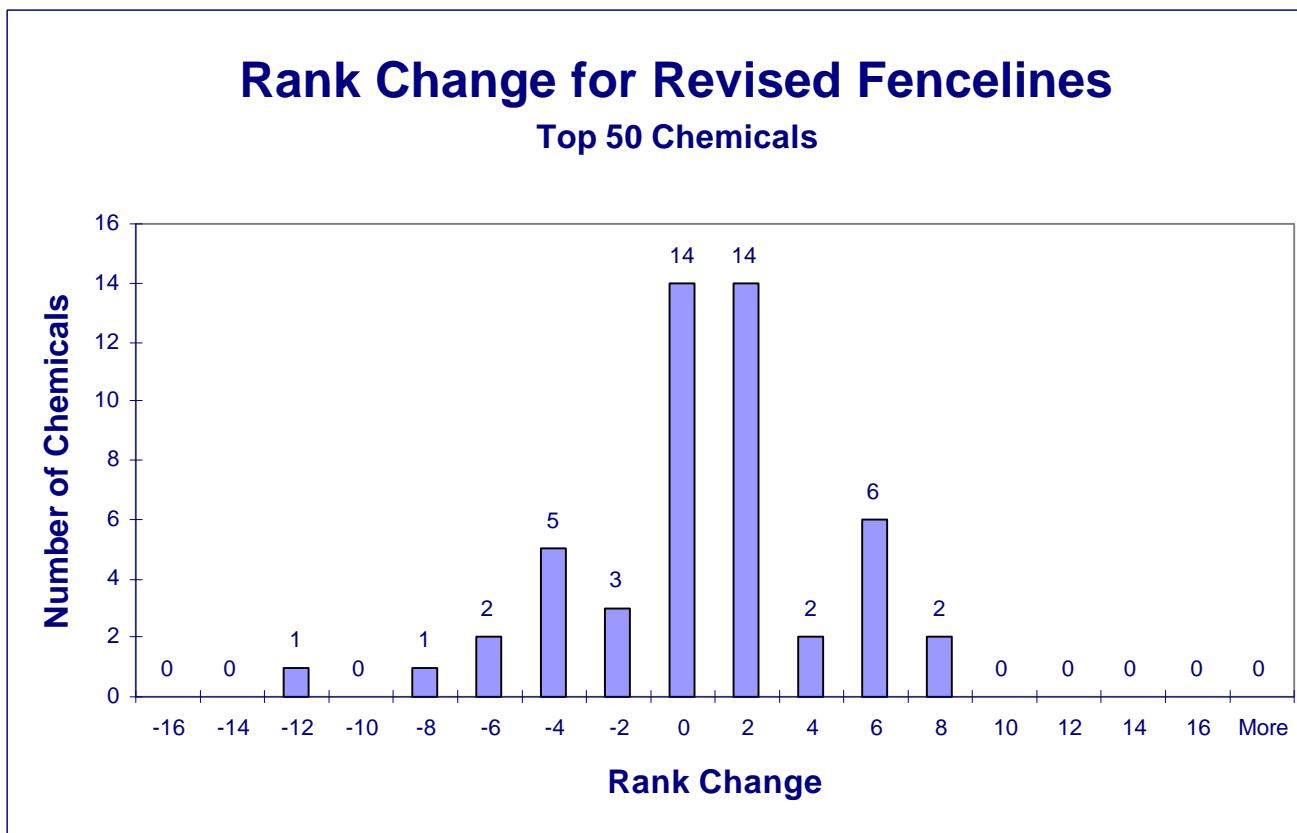


Figure 12

4.0 Summary

The draft Chemical Ranking Methodology developed under this work assignment was tested to determine the importance of various ranking factors. This involved an examination of

- The affect of dropping each primary criterion one at a time
- The affect of dropping both the RCRA Relevance and Environmental Presence criteria simultaneously
- The affect of applying an alternative approach to fenceline determination

In general, the method appears to be fairly robust in its identification of the top ranking chemicals. Dropping the RCRA Relevance, Quantity/Prevalence, or PBT criteria would significantly impact the rankings, although dropping a single criterion would not, in general, displace more than 10 chemicals from the top 50. Elimination of the Environmental Presence criterion also impacts the rankings, but not to the same degree as the other 3 criteria. Dropping both RCRA Relevance and Environmental Persistence substantially alters the rankings, with 14 new chemicals in the top 50, 11 of which changed by more than 50 ranks.

The modification to the fencelines based on creating equal groupings of chemicals in each “bin” would have a modest affect on the overall set of rankings, resulting in a change of only 1 new chemical in the top 50 and none in the top 30.